When Parents Work from Home*

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Abstract

This paper estimates the causal effect of parental right to work from home (Wfh) on their children's educational attainment. Using administrative data from the Netherlands and firm-specific information on collective agreements, we find that children whose parents gain the right to Wfh improve their scores at a high stake exam by 0.09 of a standard deviation. This result in a 4% improvement in reaching a general or academic track. Additionally, we link the collective agreement data to the labor force survey, and find that change in Wfh policies are associated with a 20 percentage points increase in Wfh propensity but no changes in other labor market outcomes. These results highlight the large potential benefits of remote work for supporting families and their children.

Keywords: Working from Home, Test scores, Work-life balance, Remote Work, Teleworking, Work Flexibility

JEL Codes: I20, J13, J22

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1 Introduction

The COVID-19 pandemic resulted in a significant shift towards remote work that has proven to be long-lasting: In 2022, 58% of US workers had the opportunity to work from home either part-time or full time (McKinsey, 2022) and by 2023, 28% of days were worked from home in the US (Barrero et al., 2023). Hansen et al. (2023) find that the number of postings offering remote work opportunities increased three-fold in the US, and five-fold or more in Australia, Canada, New Zealand, and the U.K. between 1999 and 2023. Aksoy et al. (2023) document that in 2022, US employees worked an average of 1.6 days per week from home. The expectation is that remote work will remain a permanent feature of modern labor markets (Chen et al., 2023).

Work from home (Wfh) is often described as a 'family-friendly policy', because of its potential to help in achieving work-life balance, especially for parents. In particular, it might allow parents to invest more time caring for the development of their children. Increased organizational flexibility by definition reduces constraints to the allocation of time between work and family. Indeed, Aksoy et al. (2023) report an average reduction in commuting time of 72 minutes per day, and parents increasing daily care giving by 20 minutes. While most of the research on Wfh to date has focused on its prevalence, and outcomes for workers and firms, none has investigated its impact on other family members. This paper focus on whether having parents allowed to work from home had an impact on their children's educational achievements.

Most studies on Wfh to date are descriptive or based on surveys of willingness to pay for it. One reason for the lack of causal evidence is that employees might

self-select into work arrangements that may suit their needs and those of their families. The few causal evidence are Bloom et al. (2015) and Angelici and Profeta (2024) who conducted randomized controlled trials in China and Italy, respectively and estimate a positive effects of Wfh on productivity and wellbeing.[1] In contrast Goux and Maurin (2024) report a deterioration in health for groups of workers most likely benefiting from a firm-level change in Wfh policy in France. We had to this literature on the causal effect of Wfh by relying on changes to Collective Labor Agreements (*Collectieve Arbeidsovereenkomst*) signed between workers' representative and firms (or employers' organisations) in the Netherlands, which codify the rights of workers. The identification strategy exploits firm-level variation in the introduction of formal Wfh arrangements in Collective Labor Agreements (CLA) in the Netherlands, in the two decades prior to the COVID-19 pandemic.[2] Firms formally granting their workers the right to work from home are matched to firms in the same sector with similar characteristics that do not formally recognise Wfh in their CLA. Having identified a set of treated and control firms, we use the national employer/employee register, and select employees already in place at least one year before the implementation of the agreement, who unexpectedly gain more flexibility over their work schedule; this is our treatment group. The control group consists of people working in matched firms, which did not implement such clause. We then restrict the sample to parents of children between the ages of 8 and 18, and link them to their children performance at national standardized test that children take in the last year of primary school (CITO) when aged 12. CITO re-

[1] Dutcher (2012), using a lab experiment, reports productivity gains but only for creative tasks, and Wfh is associated with a drop in productivity for "dull" tasks.

[2] Our analysis focuses on the pre-pandemic period to avoid conflicting changes in Wfh arrangements with other effects of the pandemic, especially the closing of schools and the move to on-line teaching.

sults largely determine the track that children will be allow to attend in secondary education and is thus a very high-stake exam. To estimate the causal impact of parental Wfh agreement, we implement a difference-in-differences strategy, comparing CITO test scores for children with a least one parent affected by a change in Wfh and those whose parents are employed in control firms. The over time effect is captured by the differences in CITO performance between children who sat their CITO before or after the change in Wfh was implemented.

This identification strategy allows us to estimate the Intention to Treat of being granted the right to work from home on children's educational attainment. We then complement the analysis by linking the Collective Labor Agreements data to the Labor Force Survey. This allows us to assess that changes in collective agreements do not just formalise previous behaviours regarding Wfh and do actually increase the propensity of affected parents to work from home. It also highlights differences in the educational attainments of parents working from home and any potential labour market outcomes, and thus potential trade-off for parents of a family friendly policy.

We find that children whose parents gained the right to work from home score an additional 9% of a standard deviation at the CITO, both in math and reading. While their is no effect for high achievers, pupils in the middle of the distribution become 4% more likely to score higher than the threshold allowing them to be tracked to a professional track. The effect is larger for children who were younger when the Wfh was signed and for girls, but we do not find any significant differences by parental educational level or gender. Following the revised CLA, workers become 20 percentage points more likely to report working from home. This effect does not differ by gender, education level or the presence of children, and prefig-

ure that parents working from home are unlikely to have negative labour market outcomes. Indeed, we do not find any effect of Wfh on firm mobility, hours or wages.

To our knowledge, this is the first paper presenting causal evidence on the impact of Wfh arrangements on children's outcomes. There is a relatively large literature on the impact of parental leave policies on parental careers (see Kleven et al. (2020) for a review), and a growing but smaller literature on the impact of these policies on children's developmental outcomes (Ginja et al., 2020; Powell et al., n.d.), but there is almost none on the impact of work flexibility arrangements on children's educational attainment. Work from Home arrangements are important to examine because they are likely to be relevant over a much longer period than parental leave policies, and offer parents some flexibility to invest in the education of their children, at the margin, at some critical ages.

2 Related Literature

As mentioned earlier, there is a handful of studies that examine the *causal* impact of Wfh on workers' careers. Bloom et al. (2015) conducted a randomised control trials at a large Chinese travel agency where call centre workers were for 9 months randomly allowed the right to fully work from home or be in the office and report a 13% increase in productivity, as well as improved work satisfaction and reduced churn. Similarly, Angelici and Profeta (2024) randomised workers at an Italian firms to have the right, or not, to work flexibly one day a week. They estimate that working from home increased productivity, well-being, work-life balance and care activities. On the contrary, Gibbs et al. (2023) and Emanuel and Harrington (2024)

report a drop in the productivity of workers when firms switch to Wfh during the COVID pandemic, with a third of the drop explained by negative selection into Wfh among call center workers (Emanuel and Harrington, 2024). However, part of the productivity shock might be due to other factors that changed during the pandemic.

More similar to our identification strategy is Goux and Maurin (2024) who estimate the effect of a reform giving the right to work from home in France, and compare workers in firms that signed Wfh agreement and those that did not. Since firms adopting Wfh might differ, or attract selected group of workers, they rely on a triple difference in difference strategy, based on comparing low-level employees, who were unlikely to use Wfh and mid-level employees who used it more. They estimate that mid-level workers experienced a deterioration of their self-reported health, and that a 10 percentage point increase in the proportion of workers working from home results in a 5 percentage point increase in the proportion of workers suffering from chronic disease. We improve on this identification strategy by matching treated and control firms within the same industrial sector to make them close substitute observationally, and compare the behaviour of parents with a greater incentives to invest in their children to those of parents of children who sat the high stake exams prior to the CLA granting Wfh rights being signed.

Descriptive studies based on time-use or surveys have documented that teleworkers spend more time on leisure and household production activities, and more time with family on days they work from home (Giménez-Nadal et al., 2018; Pabilonia and Vernon, 2022; Aksoy et al., 2023) and no studies have so far estimated the impact of Wfh on other family members.[3] Changes in the contact with par-

[3]Persson and Rossin-Slater (2024) use a Swedish reform increasing access to workplace flexibil-

ents may have a direct impact on cognitive development (Gupta and Simonsen (2010), Bernal and Keane (2011), Fiorini and Keane (2014), Gupta and Simonsen (2016), Fort et al. (2020)) and thereby educational outcomes. Additionally, Wfh allow parents to more easily monitor the effort that their children put towards their studies or help them with their homework. We are able to shed light on this possible mechanism by looking at how the changes correlate with changes in educational attainments at a high stake exam.

(Cowan, 2024) reports that the increase in parental care is mostly driven by college educated men. Moreover, Wfh is often mentioned in the context of gender disparities in the labor market, possibly as an effective way to reduce gender disparities in the labor market (Mas and Pallais, 2017; Nagler et al., 2024). We thus explore heterogeneity in the effect of Wfh on children's educational attainment by gender.

Lastly, there has been work on identifying occupations more likely to be teleworkable. We know for example that higher-educated and higher-wage workers are disproportionately able to work from home. For example, during the pandemic and in the US, teleworking rates for individuals holding a Master's degree or a PhD were fifteen times higher than for the least qualified employees (for Economic Co-operation and Development (2021)). As such, parental Wfh arrangements are likely to contribute to educational inequalities among children.

ity to fathers following the birth of a child and estimate that increasing paternal work flexibility reduces maternal health complications and improve the mother's wellbeing.

3 The Dutch Context

3.1 Regulation of Wfh in the Netherlands

In the Netherlands, Work From Home arrangements are regulated by collective labour agreements (CAO in Dutch) between employer organizations and unions. There are 2 types of collective agreements: Sectoral collective agreements (collective agreements within a sector) and company collective agreements (collective agreements only within a company). Company collective agreements are only relevant to large companies. Since our identification strategy relies on matching treated and control firms within sector, we focus solely on company collective agreements.

Around 80% of employees in the Netherlands are covered by a collective agreement (Dutch Ministry of Social Affairs and Employment (SZW). These agreements lay out labour conditions for all employees, such as wages, payment for extra work, working hours, probation period, pension, childcare and, relevant for this study, work from home arrangements. The provisions in a CAO are often more favourable than those prescribed by law, but they may not contradict the law.

3.2 Education and CITO Test scores

Primary education in the Netherlands consists of 8 years of comprehensive schooling (starting at the age of 4). During their last year of primary school, at age 12, 90% pupils take the CITO exam, which consists of a multiple choice questionnaire testing their competences in Dutch, Math, World orientation (Geography, History, Biology) and Study Skills. The test results usually inform recommendations of the

appropriate secondary education track. There are three possible tracks: preparatory vocational secondary education (vmbo), senior general secondary education (havo) or university preparatory education (vwo). Only those completing university preparatory education are allowed to enroll at University. While it is possible to change track during secondary education, the CITO scores largely determine the educational path of children, making it a very high stake exam.

The test is set and marked by a private company, not by the child's teacher. CITO scores are normalised and scaled between 501 and 550. A score below 536 leads to recommendation of secondary vocational education (vmbo), one between 537 and 544 to a recommendation of general secondary education (havo) and one above 545 to the academic secondary education (vwo).

4 Empirical Strategy

To estimate the impact of teleworking on children's outcomes, a direct comparison between children of parents in firms that have teleworking provisions in place and those in firms that do is problematic as the two types of firms are likely to differ in other characteristics.

Instead, one approach is to use variation in age of the children of parents who are in firms that have adopted teleworking arrangements. This strategy allows us to construct comparable groups of parents *within a firm*. Children above 12 years old at the time of teleworking implementation are passed the age at which they should sit the CITO and deemed too old to be affected by the policy changes. Parents of children below the age of 12 might, on the contrary, may have been able to affect the outcome of their children's CITO test. We create a narrow

window around 12 (+/- 4 years) to analyze the difference in CITO results between children from 8 to 11 and 13 to 16 in firms that adopted teleworking provisions in their collective agreements, with the former group being considered treated and the latter group, a control group. Children age 12 are excluded as it is unclear whether the change in working from home arrangement was implemented before or after the CITO test was taken.

This strategy has the advantage of accounting for possible parental selection into firms as parents of older school age children would likely consider the potential benefit on Wfh on the secondary education performance of their children. Additionally, if the CLA-sanctioned Wfh agreement were to only have formalised previous teleworking behaviour at the firm, the estimated effects would then be lower bounds.

However, parents of younger children might differ in other relevant characteristics. They are younger, they may have different preferences for the education of their children, and are also likely to have less seniority at the firm, which might affect their children's outcomes through other channels than working from home. To address this challenge, we employ a Difference-in-Differences strategy through firm matching. Treated firms are matched to potential control firms based on the following variables: year of (possible) teleworking implementation, sector and firm size, mean level of education, share of female workers, share of part-time female workers, share of part-time male workers, and gender-specific total wage bills. The matching is based on characteristics measured in the year before the Wfh arrangements were formalized in the collective labor agreement (year *T-1*) to limit the potential selection of workers driven by Wfh arrangement. The match on sector and year are strict, i.e. we only consider firms in the same sector with similar

characteristics in year *T-1*, while we compute the Mahalanobis distance for the other covariates. For each treatment firm, we keep the three control firms in the same sector with the smallest Mahalanobis in the year prior to the introduction of the Wfh arrangement. This matching process enables us to compare outcomes before and after teleworking implementation for both treated and control firms, and for children above and below the cut-off age of 12 at the time of the policy change.

We then estimate the following equation 1 of the determinants of child's educational performance, including child specific controls such as age and gender, and parental characteristics of the treated parent. To account for possible variations in the CITO test, we also add year of test fixed effects. Additionally, since parents working in different sectors might have different characteristics, we add firm-sector fixed effects to capture these unobservable characteristics.

$$y_{i(f,k),t} = \alpha + \lambda_t + \theta_k + \gamma X_i + \eta \text{Young}_i + \rho \text{Treated}_f + \beta \text{Young}_i \text{x Treated}_f + \epsilon_{i(f)} \quad (1)$$

where $y_{i(j,k),t}$ if the outcome of individual i in year t whose parents work in firm f in sector k. We consider a series of outcomes: normalised CITO Scores in Reading, Math and overall. λ_t and θ_k are year (when a child takes the CITO exam) and sector fixed effects respectively. Treated refers to the firms allowing Wfh in their labor agreement and Young is a dummy variable taking value 1 if the child is between 9 and 12. The coefficient of interest, β, compares older and younger children in firm that implemented a Wfh policy and untreated firms. Standard errors are clustered at the firm level to account for potential correlations within

firms.

5 Data

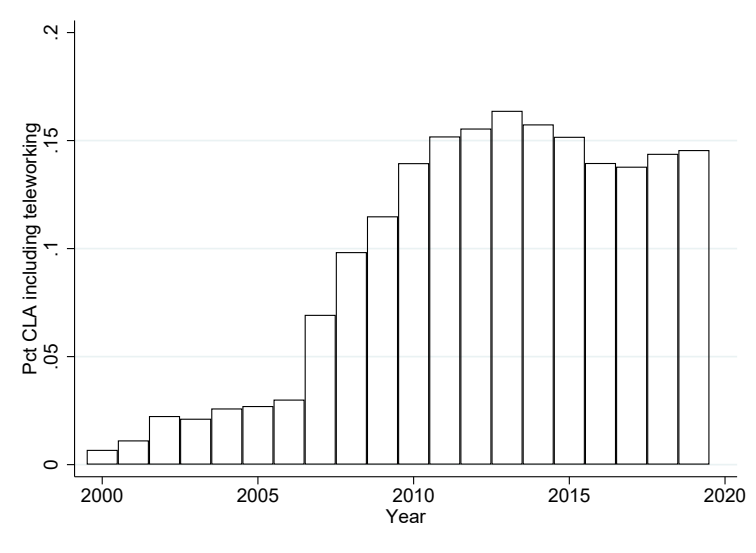
Our data comes from a variety of sources. We compiled a dataset on relevant elements of collective labor agreements using records stored by a commercial Dutch company called *XpertHR*. Those records were linked using firms identifier to the National Employer-Employee database held by the Dutch National Statistical Office (CBS). The CITO is the high stake multiple choice test taken by 90% of pupils at the end of primary schooling. We link children who passed the CITO to their parents, and to the employer-employee database to create our main database.

5.1 Data: XpertHR

XpertHR is a private company holding records of all collective labour Agreements in the Netherlands since January 1990. At the time of access (July 2020), the record held 14,912 CLAs, covering 1,665 unique employers. Note that a CLA record can cover a single firm or a full sector. We use some text analysis tools to construct a database of the various rights that workers are entitled to for each CLAs. In particular, our search identify 1,063 records mentioning "Afspraken" or "thuis/telewerken" i.e. Teleworking arrangements. Each record includes the dates at which rights are acquired or amended, allowing us to identify for each firm, when arrangement for working from home were formalised. Figure ?? display the fraction of CLA mentioning the possibility to work from home per year. Up to 2006, less than 5% of CLAs have references to teleworking. This grows substantially up to 2010 and then plateaus thereafter at around 15%. However, when excluding

sector-wide agreements we are left with 30 unique firms for which we observe a rights to work for home being granted. Information on the CLA arrangements is then matched to the CBS firm database using Firm's name. Further information on the creation of the data is available in Annex8

Figure 1: **Fraction of Labour Agreements mentioning teleworking opportunities**



Note: Authors calculations based on XpertHR

As explained above, control firms are identified by exact matching on sector and time *T-1* and we keep the three with the smallest Mahalanobis distance. Note that the matching is based on firm characteristics one year prior to the introduction of the Wfh rights, so as to reduce the selection of workers with a preference for teleworking in or out of the treated and control firms.

Table 5.1 reports the estimate of separate regressions of the matching characteristics on an indicator of treatment. The variables were normalised on the universe of firms in that year. Firms in our sample are positively selected.

	% Wage Females	% Wage Males	% Part-time Females	% Part-time Males	% Educated	Nb Workers	Nb Females	Nb Males
Treated	-0.00475	0.00475	-0.0336	-0.00686	-0.00439	333.6	145.8	187.8
	(0.0401)	(0.0401)	(0.0376)	(0.0227)	(0.0403)	(234.1)	(126.2)	(138.7)
Mean	0.288***	0.712***	0.439***	0.110***	0.388***	625.8***	267.5***	358.3***
	(0.0221)	(0.0221)	(0.0185)	(0.00979)	(0.0185)	(97.01)	(44.90)	(60.49)
R-Squared	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.02
N Obs.	133	133	133	133	133	133	133	133

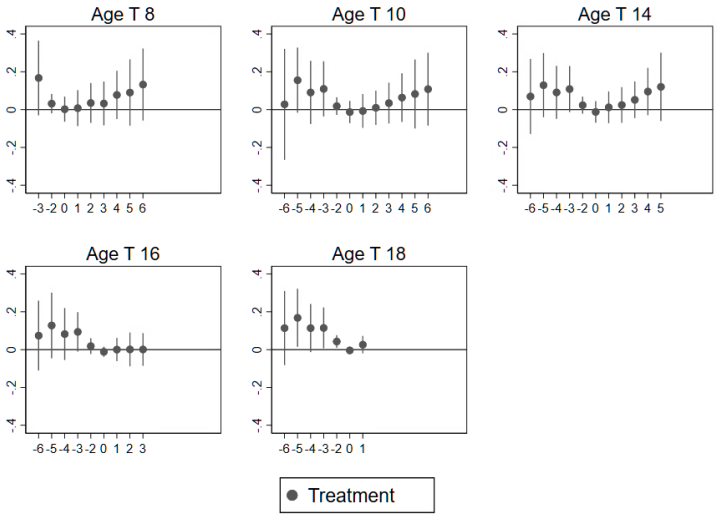
Table 1: Balancing - Firm

Firms are then matched to the employer-employee national register. Figure **??** displays the movement of workers to and out of firms in the period of the change in CLA. There is little evidence that workers disproportionately moved to firms that were to alter their labour agreement to include the rights to Wfh in the years prior to the change in CLA. Any selection of workers post change in CLA does not affect our estimates since we will estimate an intention to treat and allocate the treatment status based on the firms in which parents were working in the year before the implementation of the Wfh policy.

5.2 Data: Educational Outcomes

The children of parents working in a treated or control firms at period T-1 are identified and we extract their scores at the end of primary school national test (Cito). We exclude students who sat the test in year T, as it is unclear whether they would have been affected by the treatment. This leaves us with a population of 14,220 children, which is balanced in terms of age and gender between the control and treated group. We use the Dutch and Math scores only as other subjects are

Figure 2: Workers Flow in and out of Treated and Control Firms Prior and Following Change in Working for Home Rights



not taken by all pupils. Compare to all pupils, our sample is positively selected and performs better overall, which is consistent with firms implementing Wfh policies having more educated workforce.

5.3 Labor Force Survey data

The last source of data we use is the Dutch Labor Force Survey. The LFS is a rotating panel survey with five waves. Respondents are once interviewed thoroughly, by an interviewer from Statistics Netherlands, and are subsequently contacted by phone every three months four times.

Labour Force Survey respondents can be linked to the Employer-Employee database, which allow us to identify whether their CLA allows for teleworking.

5.4 Balancing tests

To validate our identification strategy, we first compare children's and parent's characteristics between treated and untreated firms. We estimate the following equation:

$$X_{i(j,k),t} = \alpha + \lambda_t + \theta_k + \beta \text{ Treated}_j + \epsilon_{i(j)} \tag{2}$$

where the characteristics $X_{i(j,k),t}$ of children encompass their gender and age, while those of parents include their education level, hours worked, and wages earned in the year preceding the implementation of the CLA change.

Table 2: Balancing - Children

	Gender	Age
Treated	0.00425	-0.00405
	(0.00964)	(0.0239)
Mean	0.500***	11.963***
	(0.0042)	(0.0144)
R-Squared	0.000	0.010
N Obs	16935	16935

Notes: ***,**,* indicate statistical significance at the 1%, 5% and 10% level. Standard Errors are clustered at the Firm level, which is the unit of treatment.

Tables 2 and 3 report the estimates of these regressions for children and their parents. The coefficient β in Equation (2) is consistently small and lacks statistical significance, indicating a similarity between treated and untreated parents and children. Note the matching was based on firms characteristics, not on the individual characteristics of workers, indeed it is important to note that the parents affected by the change in the teleworking arrangement, and those in matched firms, are substantially more educated than non-affected parents. This is consis-

Table 3: balancing parents

	Education	Nb Hours	Hourly Wage	Wage	Male
Treated	0.0537	26.40	1.572	3482.9	0.0257
	(0.0803)	(2.62)	(2.215)	(4462.2)	(0.0748)
Mean	0.573***	1701.5***	26.09***	46839.4***	0.609***
	(0.0498)	(48.60)	(1.055)	(2139.5)	(0.0368)
R-Squared	0.00	0.00	0.00	0.00	0.00
N Obs.	16935	16935	16935	16935	16935

Notes: ***,**,* indicate statistical significance at the 1%, 5% and 10% level. Standard Errors are clustered at the Firm level, which is the unit of treatment.

tent with the findings of Aksoy et al. (2023) and Barrero et al. (2023) who report that Wfh is more prevalent among more educated workers. However, they do not differ in reported hours of work, nor wages. Importantly, there is no significance difference in these characteristics between parents at treated and control groups, highlighting that the matching - even done at the firm level - generates a sample of very similar parents.

6 Main results

6.1 Baseline results

Table 4 reports the estimates on the interaction terms between working at period *T-1* in a firm that implements a labour agreement formally allowing teleworking and the child being less than 12 at the time of implementation. Note, that the estimate should be interpreted as an intention to treat since not all parents working in this firm might take advantage of the teleworking opportunities.

We present estimates for standardised Math score, standardised Reading score, standardised overall score, but also for having a score at important thresholds, such

Table 4: Baseline Estimation

	Z-Score Maths	Z-Score Reading	Teacher Advice	Score VWO $\geq$ 545	Score HAVO $\geq$ 537
β	0.0860**	0.103***	0.0254*	0.0103	0.0439**
	(0.0344)	(0.0295)	(0.0148)	(0.0158)	(0.0174)
N Obs.	16935	16935	12670	17252	17252
Mean	0.0631	0.105	0.174	0.203	0.533

Notes: ***,**,* indicate statistical significance at the 1%, 5% and 10% level. Standard Errors are clustered at the Firm level, which is the unit of treatment.

as below 536, which usually results in a recommendation of attending vocational secondary education, or a score above 545 which is the threshold for an academic recommendation. The last column reports whether the child was recommended to attend the comprehensive or academic track.

The table is split into three panels each representing a different specification. Panel A uses a baseline specification as in 1 but excluding the firm's sector fixed effects. In Panel B, we estimate 1 exactly and include firm's sector fixed effects so as to capture parental unobserved characteristics associated with the choice of sector or the type of parents most likely to use Wfh opportunities. For example, two firms might allow workers to work from home but the one in a sector where more tasks can be conducted from home should have a greater proportion of employees teleworking. Finally, in Panel B we implement a more restrictive specification which includes match indicator so that children whose parents work in a treated firm are compared only to children whose parents work in the three firms that were matched to this treated firms. This allows us to compare even more similar parents.

The estimate of the interaction between firms allowing teleworking and the child being less than 12 at the time of implementation should be interpreted as

an intention to treat, since we do not know whether parents actually work from home, at least occasionally. It also aggregates the effect for children who were aged between 8 and 11 at the time of the policy change, and might have thus experience different doses of the treatment.

Panel A shows that for all outcomes, children whose parents are allowed to work from home outperform their peers. The effect is quite substantial and having parents allowed to telework is associated with a 0.08 of a standard deviation increase in test score.

The remaining columns assess the effect of the Wfh policy on marginal outcomes and the final track recommendation.

Panel B and C add fixed effects for the sector of work and for the matching group respectively, so as to more tightly control for unobservable parental characteristics that might affect their propensity to use Wfh arrangements.

Overall, we find strong evidence that being allowed to work for home improves the test scores of the children at a high stake exam at the end of primary school. To put this in perspective, the effect of Wfh policy is similar to the median primary school interventions in the US which has an effect size of 0.07 standard deviation on Math score and 0.1 on reading score (Kraft, 2020). Considering that our estimate is an Intention to Treat and that according to the LFS evidence, change in CLAs are associated with a 20 percentage points increased in the proportion of parents reporting working from home, this is potentially a very large effect; in the top 10% of effective interventions and at no costs to the educational sector. In the final section, we will explore whether Wfh comes at some costs to parents.

6.2 Robustness checks

In this section, we conduct a series of robustness checks to assess the plausibility of our identification strategy.

6.2.1 Anticipation and dosage effects

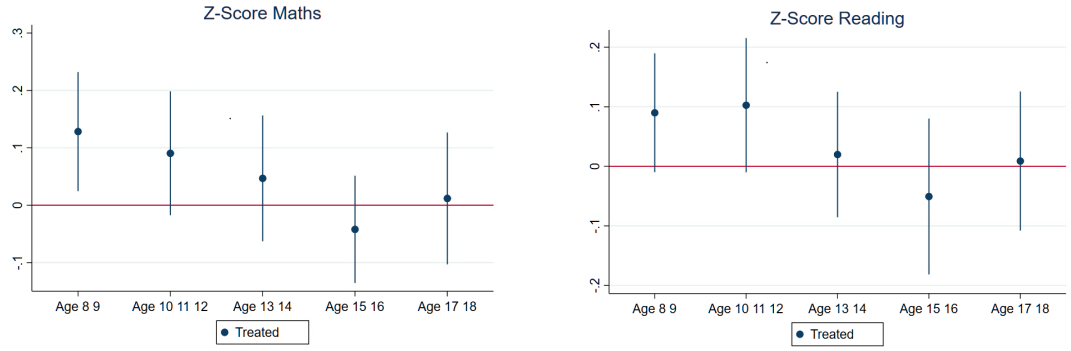
We report the estimates for each year of treatment, as in an event study to assess whether there were some anticipation effects, for example if the change in CLA mostly reflected a formalization of arrangements that were already informally in place. Post treatment, we might expect children who were younger at the time of the policy change, and thus potentially benefited of more years where their parents could work from home, to benefit more from the policies.

Figure 3 report the estimates on the performance at the CITO test for each year prior and after the change in CLA, separately for children whose parents work in treated and control firms. We set the effect at 0 for children in the control firms who are 12 in the year in which the right to work is granted. Children in treated firms who sit the test in the year the right to work from home is granted might be partially treated or not.

There is no anticipation effects - children who are older than 12 in the year in which the CLA grants the right to work from home, sat the test when no provision for teleworking was in place for their parents and thus should not have benefited from these arrangements. We find that, indeed, the estimates are close to zero for this age group and not different from those of children whose parents work in control firms. Thus there does not appear to have been any anticipation of the Working from Home policy and the change in the CLA is likely to mark an actual

change in the ability to work from home (more evidence are provided in section 7. Post treatment, there is no discernible effect in the first year (children aged 11) but younger children seems to benefit from the ability of their parents to work from home.

Figure 3: **Effect of Wfh on test score by age at Treatment**



((a)) Math

((b)) Reading

6.2.2 Placebo Analysis

To assess the plausibility of the identification strategy, we conduct a placebo analysis whereby we assume that the change in labour agreement took place in the same firms but three years prior; this is equivalent to comparing the CITO score for children aged 13 to 15 (Placebo treatment) with those aged 16 to 18 (Control group). Note, that we keep the matched firms the same as in our main analysis rather than match firms based on their characteristics in year *T-4*. In expectation, if the estimated effect in our main analysis are causal effects of the Wfh policy and not driven by parental selection or time effects, neither group should be affected when using this placebo treatment, as they undertook the CITO assessment before

Table 5: matching placebos

	Z-Score Maths	Z-Score Reading	Teacher Advice	Score VWO	Score HAVO
β	-0.00643	-0.0259	0.00557	0.00542	-0.0167
	(0.0450)	(0.0451)	(0.0210)	(0.0196)	(0.0190)
N Obs.	11268	11268	8216	11268	11268
Mean	0.0961	0.143	0.164	0.208	0.552

Notes: ***,**,* indicate statistical significance at the 1%, 5% and 10% level. Standard Errors are clustered at the Firm level, which is the unit of treatment.

Wfh provisions were in place. We estimate Equation (1) to a modified sample to assess any effects of this fictitiously timed policy and do not find evidence of any effects (**??**).

6.2.3 Jackknife

We also implement a Jackknife analysis to assess the sensitivity of our results to specific treated firms. This is crucial considering the small sample of treated firms that allow us to identify the effect of Wfh. We thus re-estimate 1 omitting one treated firm, and its associated control firms at the time. Figure A.1 in A reports the distributions of the estimates on the effect of the policy for each regression, separately for Math and Reading. The estimates are quite consistent with all estimates ranging between 0.065 and 0.1 of a standard deviation, and in only one of the sample, does the estimate become statistically insignificant (for reading only) as the Jackknife drops a large firm. Overall, the Jackknife reveals that the main estimates are not driven by specific firms and are consistent.

6.2.4 Alternative matching

Finally, we redo the matching to keep the best four closest matched control firms, rather than the best three, and re-estimate the different specifications of Equation (1). These results are reported in Appendix A. Again, despite our small number of treated firms, the main results of the impact of parental right to work from home on the educational performance of their children are largely insensitive to the choice of control firms.

Overall, these tests confirm the plausibility of the identification strategy since a placebo CLAs result in no effect. We also do not find any anticipation of the policy change, and some weak evidence consistent with the effect increasing with treatment dosage. Finally our results appear robust to alternative matching choice or specific treated firms.

6.3 Heterogeneity

We examine whether the effect varies across different dimensions, including the gender of the parent affected by the firm policy change, the gender of the child, the education level of the parent and the period at which the right was granted.

6.3.1 Treated Parent Gender

Despite the differences in the preponderance of Wfh arrangement between sectors and seniority level, Barrero et al. (2023) report similar rates of home working by gender, but Aksoy et al. (2023) note that fathers reallocate less of the freed-up time than mothers to care. Unless the Wfh policies allow fathers to close the gap in time allocated to the education of their children, we might expect teleworking

Table 6: Estimation for parents

	Z-Score Maths	Z-Score Reading	Teacher Advice	Score VWO	Score HAVO
			Fathers		
β	0.0779**	0.0916***	0.0383**	0.0312*	0.0428**
	(0.0360)	(0.0290)	(0.0163)	(0.0171)	(0.0182)
N Obs.	10431	10431	7778	10592	10592
Mean	0.0383	0.0723	0.165	0.196	0.518
			Mothers		
β	0.100*	0.123**	0.00199	-0.0259	0.0461
	(0.0512)	(0.0584)	(0.0255)	(0.0260)	(0.0287)
N Obs.	6504	6504	4892	6660	6660
Mean	0.103	0.157	0.189	0.213	0.556

Notes: ***,**,* indicate statistical significance at the 1%, 5% and 10% level. Standard Errors are clustered at the Firm level, which is the unit of treatment.

policies to be more efficient at improving the education of children when the Wfh right is provided to mothers. We investigate whether our main results differ by the gender of the treated parent. The estimates of our main model, when estimated separately by the gender of the treated parent are reported in Table 6. It does not show any substantial differences in the impact of teleworking on the educational achievement of their children by the parental gender, suggesting that fathers are as likely as mothers to engage in activities supporting the education of their children when allowed to work from home.

6.3.2 Treated Parent Education

As mentioned above, access to teleworking varies by occupation and seniority, so that in general more educated have more opportunities to work form home. It is a-priori ambiguous whether this greater propensity to work from home will result in greater impact on their children's education. More educated parents might

already be investing in support activities for their children, and Wfh does not result in more engagement or just allow them to substitute externally provided support to parental support. Alternatively, more educated parents might have a greater preference for investing in the education of their children and have greater returns to their investments, in which case, granting Wfh would result in larger educational gains for children of more educated parents. In Table 7 we report the estimates separately for lower educated parents (defined as vocational qualification only) and higher educated parents. Note that education is not reported for about one third of parents which reduces the sample size. The estimated effects are somehow larger for more educated parents, but are imprecisely estimated, so we cannot conclude that Wfh legislation increases educational inequality.

Table 7: Estimation by education level

	Z-Score Maths	Z-Score Reading	Advise	Vwo	Havo
		Educated			
β	0.0750	0.0411	-0.0438	-0.0191	0.0383
	(0.0610)	(0.0520)	(0.0271)	(0.0335)	(0.0284)
R-Squared	0.08	0.07	0.04	0.02	0.05
N Obs	6183	4525	6367	6367	6367
Mean	0.31	0.38	0.27	0.29	0.66
		Less Educated			
β	0.0100	0.0491	-0.0158	0.00147	-0.0175
	(0.0655)	(0.0732)	(0.0271)	(0.0271)	(0.0332)
R-Squared	0.10	0.08	0.03	0.02	0.06
N Obs	4274	3248	4330	4330	4330
Mean	-0.17	-0.08	0.09	0.12	0.41

Notes: ***,**,* indicate statistical significance at the 1%, 5% and 10% level. Standard Errors are clustered at the Firm level, which is the unit of treatment.

Table 8: Estimation by gender

	Z-Score Maths	Z-Score Reading	Teacher Advice	Score VWO	Score HAVO
			Girls		
β	0.104*	0.130***	0.0298	0.0105	0.0614**
	(0.0574)	(0.0447)	(0.0219)	(0.0228)	(0.0299)
N Obs.	8450	8450	6292	8606	8606
Mean	-0.0869	0.208	0.165	0.194	0.524
			Boys		
β	0.0632	0.0740	0.0206	0.00905	0.0243
	(0.0473)	(0.0556)	(0.0222)	(0.0197)	(0.0217)
N Obs.	8485	8485	6378	8646	8646
Mean	0.212	0.00213	0.183	0.211	0.541

Notes: ***,**,* indicate statistical significance at the 1%, 5% and 10% level. Standard Errors are clustered at the Firm level, which is the unit of treatment.

6.3.3 Child Gender

Similarly, in Table 8 we report estimates of the Wfh policy separately by the gender of child. There is reason a priori to expect differentiated effects by the child's gender. However, Table 8 highlights that the working from home policy is about 50% more beneficial to girls than to boys, even if this difference is not statistically significant. Having a parent allowed to work from home increases girls score in math and in reading by about 0.1 standard deviation but only by 0.06 for boys. Golsteyn and Schils (2014) reports that boys outperform girls at the CITO by 0.2 of a standard deviation in Math and are outperformed by girls by 0.18 in reading. The Wfh policy thus reduces the achievement gap by gender in math by about 20% but increases it by about the same level in reading.

6.3.4 Early vs Late Adopting Firm

Finally we split the sample in treated firms between early and late adopter. Early adopting firms might be a selected group of firms that have employees with an especially strong preference for working for home, maybe because they expect it to benefit their children. While in the later period, technological progress and societal understanding might have made it easier for workers to actually work from home. Indeed, in appendix A we report estimates separately from firms that introduced Wfh policy before 20XX or after 20xx. For early adopting firms, we find some small insignificant effects of Wfh, suggesting that in earlier periods, parents might not have made much use of their rights to work from home. For firms treated in the second period, the effects are similar to those of the full sample. Since the fraction of teleworking has substantially increased post COVID-19 pandemics, our estimates likely underestimate the current effect of teleworking rights on educational attainments.

Preliminary findings suggest that the impact appears to be more pronounced for mothers, with an increase of approximately 10 percent of a standard deviation, although the disparity with fathers does not reach statistical significance. Additionally, there is evidence indicating that the effects are more substantial for parents with higher levels of education, who are also more inclined to hold occupations conducive to teleworking.

7 Mechanisms: Labour Force Survey Evidence

We employ two strategies to delve into mechanisms: examining other labor market outcomes of parents and leveraging qualitative data from the Dutch Labor Force

Survey.

7.1 Impact on teleworking practices

We leverage the Dutch Labor Force Survey, which is linked to the matched employer-employee dataset through an individual identifier. Our analysis confirms that the year of the CLA change corresponds with a 20% rise in reported remote work, even after controlling for year fixed effects and sector-specific time trends. This provides reassurance, indicating that the opportunity to engage in teleworking, as outlined in the CLA, indeed contributes to the observed increase in reported remote work.

7.2 Parental Labor Market Outcomes

We investigate additional outcome variables for parents, including their labor market participation, wages, and hours worked. Using panel data enables us to track parents' outcomes annually, and allows us to control for individual fixed effects. We anticipate presenting more findings by the time of the conference.

Furthermore, we examine whether individuals most likely to alter their remote work arrangements are those whose children benefit most from telecommuting, particularly educated workers.

8 Conclusion

Using plausibly exogenous variation in the availability of home working arrangement, we find that children's whose parents become eligible for teleworking im-

prove their score at a crucial national exam. Eligible parents increase their use of teleworking by 20 percentage points after it appears in the labour agreement and do not suffer from any deterioration of their labour market outcomes. Gains in children test scores are thus an additional benefit of allowing parents to work from home. However, the test score gains are stronger for more educated parents; Wfh policies might thus contribute to a decrease in educational opportunities for children of less educated parents and an increase in inter-generational correlation in education.

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Appendix A. Data Annex

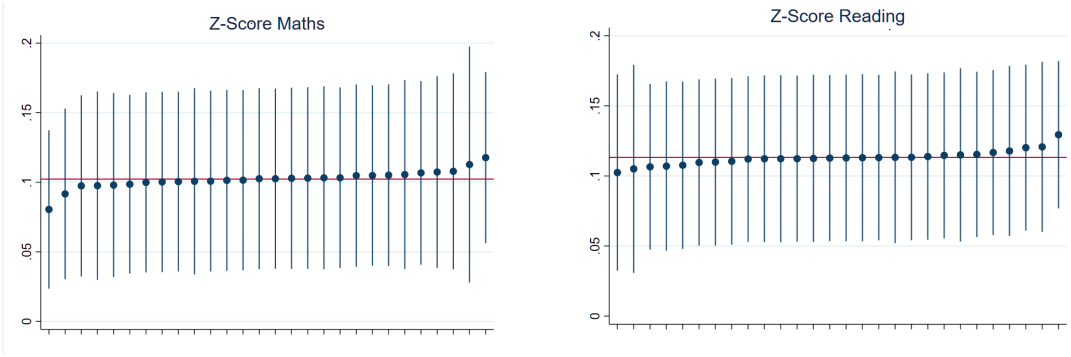
To be completed

A Appendix B. Additional Results

A.1 Jackknife estimates

In this section we report the estimates from Jackknife estimations whereby we estimate the model for all possible sub-sample where one treated firm, and its associated control firms have been excluded. The graphs report the point estimates, and the associated standard errors separately for the Math and Reading tests.

Figure A.1: **Jackknife of the Estimates of Working from Home on Normalised Test Scores Math and Reading.**



((a)) A: Math scores

((b)) B: Reading scores

A.2 Alternative Matching

In this robustness check we match the treated firms, using the same set of control variables as in the main analysis but keep the best four matches, rather than the best three. As in the main analysis, the firm characteristics are measured at period *T-1* and an exact match on industrial sector is imposed. We then re-estimate Equation (1) with this new set of control firms.