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How do COVID-19 re-hiring subsidies affect unemployment duration and incomes in Morocco? An instrumental variable approach

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Abstract

This paper attempts to estimate the impact of a rehiring subsidy implemented as part of the COVID-19 crisis impact response in Morocco. Using administrative data from the National Social Security Fund, it develops the instrumental variable method to estimate the causal effect of this scheme on unemployment duration and on beneficiaries' wages. Intended for employees who have previously received unemployment benefits, this subsidy seems to have produced contrasting effects on the beneficiaries. On one hand, it had a "disincentive" effect on their job search efforts, increasing their unemployment duration, compared to non-beneficiaries. On the other hand, it strengthened their power of bargaining and selection, leading them to choose higher paying jobs, compared to those of non-beneficiaries.

Keywords: COVID-19, Impact evaluation, Instrumental variable, Morocco, Wage subsidies

JEL classification: E24, E62, C36

1 Introduction

Theoretically argued as far back as Kaldor (1936), wage subsidies play a prominent role in active labor market policies (ALMP) (Dubin & Revers 1993; Katz 1996). Since the 1980s, governments have widely used them to improve the labor market's performance during normal times, but also in crisis periods. These subsidies have taken different forms across countries, including direct transfers to employees or employers, tax and social security exemptions or reductions, and tax credits (Grubb et al. 2007). They were massively used during the last financial crisis (Banerji et al. 2014), and were used even more extensively during the current COVID-19 pandemic (ILO & OECD 2020), given its dramatic effects on labor market (Béland et al. 2020; Pouliakaset al. 2020; Fana et al. 2020; Bundervoet et al. 2022).

The growing use of these subsidies in normal times as in times of crisis has prompted evaluation research to provide evidence on their true impact (Card 2014). The available results from evaluations exhibit mixed effects primarily from advanced countries. The most recent meta-analyses show positive but modest effects (Kluve et al. 2019;

Yeyati et al. 2019). Furthermore, several meta-analyses show a negative, and at best zero, impact on beneficiary employment (Betcherman, et al. 2004; Kluve et al. 2017). In developing countries, there is scant evidence of the effectiveness of these programs (Kluve et al. 2019) due to the very few evaluations available (Escudero et al. 2016; Mackenzie 2017).

This evidence gap on the effectiveness of subsidized employment is appealing in the case of Morocco, given the scarcity of counterfactual evaluation studies on ALMP. The need to fill this gap is even more compelling, since labor market indicators are not only structurally problematic (Haut-commissariat au plan, & World Bank 2017) but severely exacerbated by the effects of the pandemic (Paul-Delvaux et al. 2020). The national economy has lost about 432000 jobs by 2020, and total working hours have declined by 20%. These factors have led to greater unemployment, underemployment, and inactivity (Haut-commissariat au plan 2020).

This paper aims to fill this gap and provide evidence on the effectiveness of the Moroccan wage subsidy scheme introduced in 2021. The latter sights to help formal employees, who have involuntarily lost their jobs due to the COVID-19 pandemic, to accelerate the return to work by exempting their salaries from taxes. To this end, we use the instrumental variables' method to estimate the causal effect of this measure on beneficiaries' unemployment duration and re-employment wages using administrative data from the National Social Security Fund (Caisse Nationale de Sécurité Sociale CNSS) in Morocco.

This paper contributes to international literature in several ways. First, it contributes to the literature on wage subsidies in developing countries, particularly Morocco. It is important to note that the impact evaluation of the program is prominent, because it is the only program in Morocco dedicated to returning to work, since all ALMP programs in the country have so far exclusively targeted first-time job seekers.

Second, it can contribute to the international literature on the effectiveness of subsidized employment in times of crisis, particularly in response to the effects of the COVID-19 pandemic.

Third, it focuses on a specific subsidy scheme, as international experience shows that wage subsidies generally benefit employees to reduce inactivity traps and consequently the cost of unemployment insurance/assistance. Here, the measure takes the form of a wage subsidy to lower the hiring cost for employers in Morocco.

Fourth, it aims to look beyond the direct effects of the program on the return to employment to estimate and capture its impact on the quality of jobs held by beneficiaries. It also seeks to capture the heterogeneous effects of the program evaluated.

The remainder of this article is structured as follows: the second section provides a brief literature review. Section 3 describes the evaluated program and presents the data used. The fourth section is about the methodology and the estimation strategy. Section 5 reports and discusses the results of the study. The sixth section concludes.

2 Literature review

Literature on the wage subsidies impacts points to inconsistent findings on their effectiveness mainly from developed countries, (Betcherman et al. 2004; Kluve et al. 2017, 2019). The nature and magnitude of these effects depend not only on the operating

procedures of the programs but also on the labor market conditions and the economic situation (Kluve 2006; Robalino & Banerji 2009; Almeida et al. 2014).

Evidence about the effectiveness of such active labor market programs in developing countries is notoriously lacking (Betcherman et al. 2004; Mackenzie 2017). Overall, the few pieces of evidence suggest positive effects, especially in reducing unemployment. Such is the case of the “Proempleo” program in Argentina, which led to a 6% increase in salaried employment (Galasso et al. 2001). It is also the case of the “New opportunities for women (NOW)” program, targeting exclusively women, which has led to an increase in employment of around 38% in Jordan (Groh et al. 2016). In Morocco, Chatri et al. (2021) conclude that the wage subsidies of the “Idmaj” program have a positive but marginally significant effect on reducing unemployment (– 7.5%) and improving employment (8.2%).

The available literature also shows that wage subsidies can be particularly effective in times of crisis. These subsidies are likely to have rapid but lasting effects on employment (Bruhn 2020; Devereux et al. 2020), even though they are paid temporarily in this case. Galasso & Ravallion (2004), have evaluated the “Jefes” program implemented in Argentina following the 2001 crisis. They showed that the program reduced the unemployment rate by about (2.5%) and the extreme poverty rate by (10%). Similarly, Mexico’s wage subsidy program, implemented to manage the effects of the 2008 crisis, appears to have exerted a positive, but not statistically significant, effect on employment, ranging from (2.7%) to (8.7%) (Bruhn 2020).

The use of these subsidies, especially the temporary ones, was also frequent in managing the effects of the COVID-19 crisis, which had significant impacts on the labor market. These subsidies sought to protect, on one hand, the incomes of affected workers (OECD 2020), and on the other hand, to help firms avoid costly layoff, rehiring, and training processes (Giupponi & Landais 2018).

The recent adoption of these subsidies and the succession of unexpected pandemic waves have made it difficult to assess their true impact on expected outcomes. However, the limited research evidence shows that subsidized employment measures have generally improved the situation of beneficiaries.

In Australia, “Jobkeeper,” a flat-rate wage subsidy paid to workers through employers, appears to have indeed played a significant role in the first half of 2020, reducing total job losses by at least 700000 during the crisis, equivalent to (5.2%) of March 2020 employment (Bishop & Day 2020). In addition, Maré & Hyslop (2021) found a positive impact of New Zealand’s COVID wage subsidy (CWS) program on labor market flows. They found that the drop in job turnover was higher in subsidized firms than in unsubsidized ones. However, the excessive turnover rate in subsidized firms had returned to its pre-lock-in level by September, while that in unsubsidized firms remained low. As regards Graham & Ozbilgin (2021), results showed that the program preserved (6.5%) of steady-state employment relationships. Moreover, the authors provided evidence on the effectiveness of these subsidies in reducing unemployment compared to two alternative policies, namely, increased unemployment benefits and lump-sum transfers to all households.

In contrast to the previous results, Linden et al. (2021), using five different models, find that the structure and incentives of the Irish wage subsidy scheme (CWS) lead to a

strong disincentive to work. The authors explain these disincentive effects mainly by the generosity of unemployment benefits and the evolution of labor costs. In particular, the authors find that matching the structure of unemployment benefits and the wage subsidy only partially addresses these disincentive effects.

It is worth noting that the literature on programs implemented in response to the COVID-19 crisis seems to have focused more on the direct effects of wage subsidies (OECD 2021). Yet, wage subsidies are widely recognized to produce spillover effects that may significantly reduce their effectiveness, such as deadweight, substitution, and displacement effects (Calmfors 1994; Bucher 2010; Crépon et al. 2013; Brown 2015). Moreover, even when the targeting of beneficiaries is well-defined and most likely to increase the effectiveness of employment subsidies (Martin & Grubb., 2001; Bernhard et al. 2008), the latter could be affected by the stigmatization of participants. It occurs when subsidized workers are considered relatively less productive than unsubsidized workers (Brown 2015; Burtless 1985).

Moreover, the international literature suggests that wage subsidies can also adversely affect incentives if maintained for too long by hindering the reallocation of labor. Devereux et al. (2020) suggest that such support should be temporary. These findings suggest the increased effectiveness of short-term active labor market measures in response to the effects of the current health crisis.

Table 1 summarizes the most relevant impact evaluations of employment subsidies using different methods:

3 Program and data description

As in many countries, the pandemic has caused unprecedented socioeconomic disruptions in Morocco and had a deleterious effect on its labor market already suffering from major structural issues.

Although, the country has witnessed strong economic growth during the last years (gross domestic product (GDP) averaging 4.2% a year), nevertheless it has failed to create enough decent and highly productive jobs to absorb the inflow of working-age population. (HCP and Banque Mondiale 2017). In addition, the low female labor force participation remains one of the major challenges facing the Moroccan labor market, as shown by the average female participation rate over the last 20 years, which stands at around (24%), versus (74%) for men.

In addition to these dysfunctions, unemployment among graduates is no less significant, as they are not sufficiently integrated into the labor market. The average unemployment rate for this group has exceeded (22%) over the last 20 years, while it is only (4.6%) for those without any degree. This may highlight also the issue of skills mismatch among the existing labor force and skill-sets needed by employers.

Moreover, the Moroccan labor market has a very precarious structure, dominated by informal employment. The latter is estimated at (67.6%) of total employment in Morocco (HCP 2023).

All these challenges have been exacerbated with the COVID-19 crisis sequels, compelling the Moroccan government to take strong actions to mitigate the effects on both the informal and formal sector.

Table 1 Literature review

Authors	Country	Program	Methods	Key finding
Galasso et al. 2001	Argentina	Proempleo : wage subsidy and specialized training program provided to a random sample of welfare participants	Difference in Differences and instrumental variables	Employment has improved amongst voucher recipients. However, there are no signs of an impact on their incomes
Groh et al. 2016	Jordan	New opportunities for women : soft skills training and wage subsidy vouchers for young female graduates	Randomization	The wage voucher has led to an increase in employment in the short run, but the average effect is much smaller and no longer statistically significant after the voucher period has expired
Chatri et al. 2021	Morocco	Idmaj : employment subsidy targeting higher education graduates	Propensity score matching	The program has a positive but marginally significant effect on reducing unemployment and improving employment
Galasso & Ravallion 2004	Argentina	Jefes : direct income support for families whose head has become unemployed because of the crisis	Propensity score matching	The program has reduced the unemployment rate and has contributed to social protection during crisis
Bruhn 2020	Mexico	Wage subsidy program : implemented in response to the economic crisis to firms to keep their workers	Difference in Differences	The use of wage subsidies may be particularly effective during an economic crisis, the program had a positive, but not statistically significant effect on employment during the program's duration
Bishop & Day 2020	Australia	Jobkeeper : a wage subsidy to help firms affected by COVID-19 retain their staff	Difference in Differences	JobKeeper played an important role in cushioning the decline in employment over the first half of 2020, it had reduced total job losses by at least 700,000 during the crisis
Maré & Hyslop 2021	New Zealand	COVID wage subsidy (CWS) : a 12-week lump sum subsidy payment to employers	Descriptive analysis	New Zealand's COVID wage subsidy (CWS) program had a positive impact on labor market flows. In addition, the drop in job turnover was higher in subsidized firms than in unsubsidized ones
Graham & Ozbilgin 2021	New Zealand	COVID wage subsidy (CWS) : a 12-week lump sum subsidy payment to employers	Structural macroeconomic model	The wage subsidy has prevented a large number of job losses. It has benefited the most to those who were most affected by lockdowns (Service sector and young workers)
Linden et al. 2021	Ireland	Irish COVID-19 wage subsidy scheme	Microsimulation modelling	The scheme (CWS) lead to a strong disincentive to work, mainly because of the generosity of unemployment benefits and the evolution of labor costs

In this paper, we aim to provide evidence on the impact of the wage subsidy scheme for formal workers implemented as a response to the effects of the COVID-19 crisis.

This scheme was introduced by the 2021 Finance Act to accelerate the return to employment for employees who involuntarily lost their jobs. It is important to highlight that the epidemiological conditions were improving during that period, the final phase of lockdown release started in July, 2020. Furthermore, the official launch of the national vaccination campaign took place in January, 2021 allowing people to re-exercise their normal lives.

The wage subsidy involves a 12-month income tax exemption on gross monthly salaries less than 10000 MAD, paid to the employees who lost their jobs between the 1st march and 30th September 2020. However, the employee can only benefit once from this exemption under the following conditions: (i) to get a job during 2021, (ii) to previously benefit from the unemployment benefit (UB), which is restricted to formal workers of the private sector covered by the social security scheme (CNSS).

The Unemployment Benefit (UB) is regulated by the social security law in Morocco. The latter states that this benefit covers up to 6 months for affiliated persons seeking a new job who have accumulated a minimum number of declared working days (780 during the last 36 months before the loss of employment). The monthly amount of the benefit is equal to 70% of the average reference salary declared over the past 36 months without exceeding the minimum legal wage.

To evaluate the impact of this scheme, we will use the database of the National Social Security Fund (CNSS). It covers 58292 formal employees who lost their jobs during 2020 and applied for unemployment benefits. Data cleaning by eliminating outliers and observations with a monthly non-taxable salary (less than or equal to 2500 MAD) reduced the population to 49313. Table 2 presents the main descriptive characteristics (details in Tables 5, 6, and 7).

Table 2 Descriptive statistics

Variable	Number of observations	Mean or proportion	Standard error
Age	49313	39.39	9.67
Number of employees affiliated in the company	49313	3851.869	11886.05
Unemployment benefit duration	20872	169.44	29.08
Re-employment wage	16101	4499.911	4954.77
Average monthly salary	16101	4395.522	4942.715
Median monthly salary	16101	3743.023	5102.406
Months worked	16101	6.446	3.481739
Sex	49313	71.79%	–
Return to work in 2020	10375	64.44%	–
Return to work in 2021	5726	35.56%	–
Date of job loss	49313	66.36%	–
Unemployment benefit	20911	42.40%	–
Tax exemption	1819	3.69%	–
Construction sector	8059	16.34%	–
Industry sector	9911	20.10%	–
Service sector	30773	62.40%	–

It reveals that 20,911 persons have received the unemployment benefit, (72.33%) of whom were men. The sectoral distribution of these beneficiaries shows that the manufacturing industry sector holds (22.67%) of the total number of beneficiaries, followed by the construction sector (17.58%) and the administrative and support services sector (15.83%). It is noteworthy that the average duration of benefit is 169 days, given that the maximum period is 180 days.

Among these beneficiaries, (28.37%) were able to return to the labor market, 2836 of which returned in 2021, (78.42%) of whom were men. Without unemployment benefits, 10169 individuals managed to find a job, of which 2890 in 2021.

Finally, it is worth mentioning that 1819 employees meet all the eligibility requirements for the tax exemption on their recover salaries. Thus, the conditions of eligibility for the exemption are very restrictive. In addition, the average monthly wage of those exempted is 3817 MAD. The proportion of exempted men is (79.16%) against (20.84%) among women. By age group, most beneficiaries are between 30 and 35 years, i.e., (23.42%) of the beneficiaries, then those between 35 and 40 years (21.39%) and those between 40 and 45 (16.88%). The exempted are mainly from the construction sector (22.43%), followed by the administrative and support services sector (16.55%) and the manufacturing industry (15.83%).

4 Methodology and estimation strategy

This paper uses Roy–Rubin’s model of potential outcomes (Roy 1951; Rubin 1974) to provide evidence on the effectiveness of the program described above. This model estimates the average treatment on treated ATT given by

$$ATT = E(Y_1|T = 1) - E(Y_0|T = 1)$$

with $T \in \{0, 1\}$ a binary variable that indicates the treatment status. It takes 1 in case of treatment and 0 otherwise. Y_1 is the outcome in case of treatment, and Y_0 is the outcome in case of non-treatment.

Since $E(Y_0|T = 1)$ is not observable, we use the selection method on unobservables of instrumental variables. This method identifies the causal effect of the treatment T on the outcome, Y_i , using an "instrumental" variable Z_i that modifies the beneficiary status of individuals independently of their potential outcomes. Thus, the average treatment effect estimated is a local average treatment effect as it can only be identified for the sub-population of compliers (Imbens and Angrist 1995).

We will use here a two-step procedure to estimate the causal effect of T (here subsidizing return to work) on two outcomes (Y). The first outcome is the unemployment duration to check whether the program accelerated the return to work for the beneficiaries. Again, the scheme was designed to reduce the hiring cost of those who lost their jobs through tax exemptions of their re-employment wages. The second one concerns the quality of employment, since the lower hiring cost should reduce the beneficiaries' unemployment duration and preserve their human capital, which will promote their productivity and, by extension, their income. Thus, this second result will be approximated by the re-employment wage.

Formally, the first step is to regress the treatment variable T_i on the instrumental variable Z_i , controlling for the observable characteristics X_i :

$$T_i = a + bX_i + cZ_i + u_i$$

Then, we regress the outcome variables on the predicted treatment \hat{T}_i , controlled by the characteristics X_i :

$$Y_i = \alpha + \beta X_i + \theta \hat{T}_i + \omega_i$$

$\alpha = E(Y_0)$ and θ_i is the treatment effect.

In the case of a binary instrumental variable, the treatment effect is given by

$$LATE = \hat{\theta} = \frac{E(Y/Z = 1) - E(Y/Z = 0)}{E(T/Z = 1) - E(T/Z = 0)}$$

Nevertheless, identifying a valid instrument is often challenging as it must satisfy all the following assumptions (Angrist et al. 1996):

- The instrument must correctly determine the participation of individuals in the treatment, the average causal effect of Z on T is non zero.
- The exclusion restriction: Z affects the outcome Y only through T . Formally, for any Z, Z' and for any T :

$$Y(Z, T) = Y(Z', T)$$

- The independence assumption: Z does not share common causes with the outcome Y , i.e., the assignment to the treatment is random:

$$\Pr(Z = c) = \Pr(Z = c')$$

- The monotonicity assumption which stipulates that the average treatment effect applies only to the "compliers" subpopulation.

Therefore, we believe that the unemployment benefit can be a binary instrument (Z) that satisfies these assumptions. Indeed, as mentioned above, this benefit determines the participation of individuals in the treatment, as long as employees who have found a job only benefit from the tax exemption on their re-employment wages if they have received this unemployment benefit. Similarly, the chosen instrument does not increase the chances of individuals returning to work only through its effect on treatment. Moreover, unobservable factors that may affect the outcome variables, such as motivation, commitment, or attachment to the job, have no direct effect on whether or not individuals receive this benefit. The latter is explained exclusively by the number of days worked before the job loss. Finally, compliance is fully guaranteed insofar as the income tax is not liquidated on a declarative basis, but is deducted at source according to Moroccan regulations.

To verify the validity of the instrument used, we have conducted two tests, namely, the under-identification test and the weak identification test (see Table 3). Weak identification arises when the excluded instruments are correlated with the endogenous regressors, but only weakly. Estimators can perform poorly when instruments are weak, and different estimators are more robust to weak instruments. The test statistic:

Table 3 Testing instrument validity

	Under-identification test Anderson canon. corr. LM statistic (Chi-sq(1) P-val)	Weak identification test Cragg–Donald Wald F statistic	Stock-Yogo weak ID test critical values			
			10% maximal IV size	15% maximal IV size	20% maximal IV size	25% maximal IV size
Total sample	2707.479 (0.0000)	5128.793	16.38	8.96	6.66	5.53
Women	553.082 (0.0000)	997.294				
Men	2158.380 (0.0000)	4147.354				
Age < 25	95.260 (0.0000)	271.377				
25 = < Age < 35	1029.358 (0.0000)	2018.724				
35 = < Age < 45	897.233 (0.0000)	897.233				
45 = < Age < 60	664.221 (0.0000)	1215.420				
Age ≥ 60	19.620 (0.0000)	49.166				
Construction sector	583.397 (0.0000)	1130.644				
Industry sector	412.375 (0.0000)	733.814				
Service sector	1703.002 (0.0000)	3261.871				

Cragg–Donald Wald F statistic is based on the rejection rate r tolerable to the researcher if the true rejection rate is 5%. Stock and Yogo (2005) tabulated values consider various values for r . To be able to reject the null that the size of the test is unacceptably large (versus 5%), the Cragg–Donald Wald F statistic must exceed the tabulated critical value. In the total sample, the statistic (5128.48) is greater than the Stock and Yogo (2005) critical values, thus we reject the null hypothesis; the bias is acceptable and the instrument is not weak.

The under-identification test is a Lagrange Multiplier test of whether the equation is identified, i.e., that the excluded instruments are “relevant”, meaning correlated with the endogenous regressors. The test is essentially the test of the rank of a matrix: under the null hypothesis that the equation is under-identified, the matrix of reduced form coefficients on the $L1$ excluded instruments has rank = $K1 - 1$, where $K1$ = number of endogenous regressors. Under the null, the statistic is distributed as Chi-squared with degrees of freedom = $(L1 - K1 + 1)$. A rejection of the null indicates that the matrix is full column rank, i.e., the model is identified. In the total sample, the p value of the Anderson canon. corr. LM statistic (2707.479), is significant, thus we conclude that the instrument is relevant.

Consequently, the results of these tests broadly support the arguments above for using the benefit as an instrument in our two-stage regression.

5 Results and discussion

Table 4 presents our estimates of the causal effect of the return-to-work subsidy unemployment duration and wages of beneficiaries (details in Tables 5, 6, and 7). The results include estimation for the total sample, by sex, by age group, and by sector. It follows

Table 4 Treatment effect results

	Number of observations	Treatment effect	
		Unemployment duration	Re-employment wage
Total sample	5726	1.23*** (0.13)	1843.18*** (227.72)
Women	1233	1.64*** (0.28)	3772.78*** (634.46)
Men	4493	1.12*** (0.48)	1328.83*** (236.03)
Age < 25	143	1.40 (1.09)	-238.71 (295.73)
25 = < Age < 35	2092	0.94*** (0.20)	1297.35*** (260.35)
35 = < Age < 45	2008	1.38*** (0.21)	2731.54*** (480.25)
45 = < Age < 60	1455	1.37*** (0.26)	1025.13** (484.07)
Age ≥ 60	28	0.88 (1.31)	436.27 (1521.17)
Construction sector	1200	1.78*** (0.28)	904.61** (361.87)
Industry sector	935	1.88** (0.32)	1723.93*** (651.62)
Service sector	3558	0.85*** (0.16)	2174.27*** (301.87)

Bold type indicates the estimated parameters. Standard errors are shown in italic in parentheses

that the effects thus estimated are overall statistically significant. They are also consistent with the available theoretical and empirical literature. These estimates reveal two main results, which complement each other, providing evidence about the program's effectiveness.

First, it shows that the rehiring subsidy did not reduce the duration of unemployment for beneficiaries. We find that unemployment durations of beneficiaries were 1.23 months longer than those of non-beneficiaries. This positive effect on the unemployment duration of beneficiaries is observed for both men and women but seems to be more pronounced when the beneficiary is female. It also occurs regardless of their sector of activity, albeit with different degrees. The effect is less pronounced among beneficiaries in the service sector than in the construction or industrial sectors. The heterogeneity is most noticeable when analyzing the causal impact of the tax exemption on the unemployment duration of beneficiaries by age group. It turns out that the tax exemption does not affect unemployment duration when the beneficiary is young (under 25 years) or senior (over 60 years).

Nevertheless, this positive effect of the wage subsidy on the duration of unemployment, which may seem counterintuitive and counterproductive, is due to the design of the Moroccan subsidy scheme, making eligibility for the wage subsidy conditional on receiving unemployment benefits. Despite its compensation level, its constant profile, and its duration, this design is, in fact, likely to increase the beneficiaries' unemployment duration in three main ways.

The first is mechanical, as long as rehiring subsidy beneficiaries first had to await the acceptance of their applications for the unemployment benefit before receiving the subsidy (tax exemption) if they re-entered the labor market. This "waiting period" is not required for non-beneficiaries of the wage subsidy, who must accelerate their job search efforts as soon as they lose their jobs.

The second, broader one, is related to the theory of incentives in the labor market, especially in a partial equilibrium framework (see Tatsiramos & van Ours 2014). In this framework, the combination of these two benefits (the unemployment benefit and the rehiring subsidy) is likely to have a “disincentive” effect on beneficiaries, leading them to reduce their job search efforts compared to what they would have done in the absence of this benefit.

Moreover, evidence of the impact of unemployment benefit has confirmed its negative effect on the unemployment exit rate, using both the double-difference method (e.g., Card & Levine 2000; Lalive et al. 2006) and regression on discontinuity (Card et al. 2007; Lalive 2008; Schmieder et al. 2016). These papers also show that this negative effect only begins to fade as the benefit duration approaches its maximum (Gerfin & Lechner 2002). This behavior occurred in the program evaluated in this paper, since the average benefit of the unemployment benefit was 169 days, knowing that the maximum benefit period is 180 days. Thus, it confirms that insured employees who have lost their jobs prefer to take full advantage of the unemployment benefit and only accelerate their job search efforts once the duration of the benefit is close to its legal length.

The third way, also drawing on lessons from incentive theory, refers to the effect of unemployment benefits on the reservation wages of beneficiaries. Indeed, in the presence of unemployment benefits, jobseekers have an incentive to modify their reservation wages for what they would have set in its absence (Ehrenberg & Oaxaca 1976). It reduces their labor market demand, thus delaying their return to work.

Our second main result complements the first by validating the program’s effect on beneficiaries’ wages after they return to work. Indeed, our estimates show that the rehiring subsidy appears to increase the wages of beneficiaries by about 1843 MAD compared to non-beneficiaries. Again, the heterogeneous effects produced are more apparent across age groups. We find a positive impact on beneficiaries’ wages aged between 25 and 60, a negative impact among beneficiaries younger than 25, and a neutral effect for those older than 60. In contrast, it appears to have increased both female and male beneficiaries’ wages compared to non-beneficiaries by, respectively, 3772.78 MAD and 1328.83 MAD. Hence, this is consistent with empirical evidence that women benefit more from the positive effects of subsidy programs (Bergemann and Van den Berg 2008; Groh et al. 2016). Moreover, beneficiaries from all sectors returned to work with greater wages than their non-beneficiary peers. This positive impact is higher for beneficiaries from the service sector compared to those from other sectors.

It is noteworthy that the positive effect of the scheme on wages can be attributed, apart from the upward pressure it is likely to exert on reservation wages as explained above, to two other important reasons.

The first reason relates to the specificities of the tax regime governing salaries in Morocco. The employers deduct taxes on salary income at source. Thus, tax exemptions on wages do not genuinely benefit employees but rather support employers’ cash

flow and profitability. As a result, jobseekers whose wages are tax-exempt are likely to demand higher net wages to “take advantage” of the tax exemption, at least in part.

The second one refers to the selection effect that job seekers may have in the presence of unemployment benefits. Literature confirms that job seekers could become more selective in their job choices and accept only those whose tasks are most appropriate to their skills and aptitudes. It allows them to maintain and improve their human capital, to increase their productivity and, consequently, their wages (Marimon & Zilibotti 1999). The beneficiaries’ job stability compared to non-beneficiaries also reflect this selection effect. Indeed, only (9.6%) of wage subsidy beneficiaries have left the labor market, compared to (27.4%) of non-beneficiaries.

In an unprecedented and very uncertain context (COVID-19), the subsidy design adopted in Morocco was conditional on the benefit of the unemployment benefit. Nevertheless, it seems to reduce the impact of spillover effects affecting the effectiveness of this type of active labor market program, particularly those of stigmatization and deadweight loss. Indeed, the evidence shows that wage subsidies may stigmatize beneficiaries by giving false signals about their productivity and, as a result, place them in lower-paying jobs (Burtless 1985; Woodbury & Spiegelman 1987; Dubin & Rivers 1993), including for programs developed in Morocco (Chatri et al. 2021).

Nonetheless, our results show that a rehiring subsidy coupled with unemployment benefits, increase the beneficiaries’ bargaining and selection power, thus holding better quality jobs with higher wages than non-recipients. The beneficiaries’ higher remuneration and job stability suggest that the ones re-employed would not have had the same employment opportunities in the absence of the program. In other words, the subsidies would not have had a deadweight loss effect on employers.

Overall, the rehiring subsidy scheme (tax exemption on re-employment wages) coupled with the unemployment benefit appears to have contrasting effects on beneficiaries. On one hand, and as Linden et al. (2021) show for a similar design in Ireland, it would have a “disincentive” effect on their job search efforts, thus delaying their exit from unemployment compared to non-beneficiaries. On the other hand, this negative effect would have been combined with a positive impact on their bargaining and selection power, leading them to choose higher-paying (higher wages) and probably more stable jobs than non-beneficiaries.

The trade-off between these two effects does not present real problems for public policy in normal times. However, within the COVID-19 crisis context and the massive job destruction that followed, job preservation and shortening the duration of unemployment were the primary objectives of the various public interventions in the labor market (OECD 2021). In this context, we believe that the restrictive and inflexible nature of the eligibility conditions for return-to-work subsidies is inappropriate in times of crisis. Most unemployed are excluded from the program and delay the job search effort through the unemployment benefit. Therefore, we suggest that dropping the latter

condition (unemployment benefit) might encourage job seekers to accelerate their job search and set their reservation wages at a lower level, thus improving the program's effectiveness in times of crisis. Furthermore, it could strengthen the job loss fund's cash flow by reducing the duration of its payments to insured job seekers.

6 Conclusion

This paper aims to evaluate the effectiveness of temporary wage subsidies implemented by Morocco targeting formal employees who lost their jobs due to COVID-19. The counterfactual impact evaluation is conducted using the instrumental variables method, based on administrative data from the National Social Security Fund. The evaluation focused not only on unemployment reduction but also on the quality of the employment held by the beneficiaries, as measured by the re-employment wage.

Our estimates provide some key results for evaluating the program's effectiveness. First, the rehiring subsidies did not reduce the beneficiaries' unemployment duration compared to non-beneficiaries. However, it had a significant and positive effect on their re-employment wages. These contrasting effects are attributable to one of the main conditions for these subsidies, namely, the unemployment benefit. There is ample evidence that the latter is likely to decrease the beneficiaries' job search efforts and increase their unemployment duration. In addition, it increases their reservation wages and supports their bargaining and selection power, allowing them to choose better-paying jobs.

Since these subsidies are temporary and set up to address the massive job losses caused by the crisis, their effectiveness should, in our perspective, be measured primarily by their positive impact on reducing unemployment and, second, by their effect on improving the quality of jobs.

Consequently, we suggest reviewing the eligibility criteria for these subsidies to increase their effectiveness. Removing the condition of prior receipt of unemployment benefits is particularly relevant to encourage job seekers to accelerate their job search and set their reservation wage at a lower level, which would improve the program's effectiveness in a crisis period. The reform of the unemployment benefit towards a digressive and graduated system could also reduce unemployment duration for beneficiaries. This is plausible, since our results show that the program in question produces heterogeneous effects, especially according to the age of the beneficiaries. The program has no significant impact on young people (under 25 years) or seniors (over 60 years).

Appendix

See Tables [5](#), [6](#), [7](#)

Table 5 Descriptive statistics

Variable	Description	Number of observations	Mean or proportion	Standard error	Min	Max
Age	Years	49313	39.39	9.67	15	72
Number of employees affiliated in the company	Number of affiliates in the company	49313	3851.869	11886.05	0	57950
Unemployment benefit duration	Days	20872	169.44	29.08	14	180
Re-employment wage	MAD	16101	4499.911	4954.77	2500.22	99450.83
Average monthly salary	MAD	16101	4395.522	4942.715	1630	99270.67
Median monthly salary	MAD	16101	3743.023	5102.406	0.18	287745.2
Months worked	Months	16101	6.446	3.481739	1	15
Sex	1 if male and 0 otherwise	49313	71.79%	–	–	–
Return to work in 2020	1 if yes and 0 otherwise	10375	64.44%	–	–	–
Return to work in 2021	1 if yes and 0 otherwise	5726	35.56%	–	–	–
Date of job loss	1 if the employee lost his/her job between March 1 and September 30, 2020 0 otherwise	49313	66.36%	–	–	–
Unemployment benefit	1 if the employee has benefited from the UB and 0 otherwise	20911	42.40%	–	–	–
Tax exemption	1 if the employee is exempt 0 otherwise	1819	3.69%	–	–	–
Construction sector	1 if the employee is in the construction sector 0 otherwise	8059	16.34%	–	–	–
Industry sector	1 if the employee is in the industry sector 0 otherwise	9911	20.10%	–	–	–
Service sector	1 if the employee is in the service sector 0 otherwise	30773	62.40%	–	–	–

Table 6 Treatment effect on unemployment duration

	Total sample	Women	Men	Age < 25	25 = < Age < 35	35 = < Age < 45	45 = < Age < 60	Age > 60	Construction sector	Industry sector	Service sector
Number of observations	5726	1233	4493	143	2092	2008	1455	28	1200	935	3558
Treatment	1.23*** (0.13)	1.64*** (0.28)	1.12*** (0.48)	1.40 (1.09)	0.94*** (0.20)	1.38*** (0.21)	1.37*** (0.26)	0.88 (1.31)	1.78*** (0.28)	1.88** (0.32)	0.85*** (0.16)
Controls	0.24** (0.10)	–		0.4 (0.58)	– 0.02 (0.15)	0.44** (0.08)	– 0.45** (0.23)	– 1.39 (2.02)	0.29 (0.36)	0.14 (0.23)	0.28 (0.11)
Age	0.02 (0.004)	0.005 (0.01)	0.004 (0.005)	0.15 (0.24)	0.06 (0.02)	0.01 (0.02)	0.003 (0.02)	0.03 (0.14)	– 0.01 (0.01)	0.01 (0.01)	0.007 (0.005)
Construction	– 0.63 (0.54)	– 1.11 (1.55)	– 0.56 (0.58)	0.34 (0.82)	– 1.08 (0.91)	– 0.28 (0.90)	– 0.47 (1.01)	1.73 (0.98)	–	–	–
Industry	– 0.61 (0.54)	– 1.10 (0.53)	– 0.55 (0.58)	– 0.20 (0.71)	– 1.39 (0.92)	– 0.05 (0.90)	– 0.21 (1.01)	– 2.72 (2.16)	–	–	–
Service	– 0.84 (0.54)	– 1.38 (1.52)	– 0.76 (0.57)	–	– 1.59* (0.90)	– 0.45 (0.89)	– 0.34 (1.00)	–	–	–	–
Number of Affiliates	– 1.52e-05 (3.61e-06)	3.29e-05*** (1.01e-05)	– 1.25e-05*** (3.87e-06)	– 3.93e-06 (2.70e-05)	– 7.39e-06 (5.10e-06)	– 2.01e-05*** (6.68e-06)	– 2.55e-05*** (8.28e-06)	– 3.5e-05 (1.55e-04)	– 4.65e-05 (2.55e-05)	2.67e-05 (9.27e-05)	– 1.49e-05 (3.61e-06)
Constant term	6.81*** (0.58)	7.77*** (1.56)	7.17*** (0.60)	3.11 (5.70)	6.19*** (1.18)	5.75*** (1.35)	5.94*** (1.94)	5.79 (9.89)	6.58 (0.75)	5.82 (0.60)	5.83 (0.28)

Bold type indicates the estimated parameters. Standard errors are shown in italic in parentheses. *, **, and *** are used to indicate coefficients' statistical significance at the 10, 5, and 1% levels, respectively

Table 7 Treatment effect on re-employment wage

	Total sample	Women	Men	Age < 25	25 ≤ < Age < 35	35 ≤ < Age < 45	45 ≤ < Age < 60	Age > 60	Construction sector	Industry sector	Service sector
Number of observations	5726	1233	4493	143	2092	2008	1455	28	1200	935	3558
Treatment	1843.18*** (227.72)	3772.78*** (634.46)	1328.83*** (236.03)	-238.71 (295.73)	1297.35*** (260.35)	2731.54*** (480.25)	1025.13** (484.07)	436.27 (1521.17)	904.61** (361.87)	1723.93*** (651.62)	2174.27*** (301.87)
Controls											
Sex	-623.17*** (181.92)	-	-	-81.79 (157.51)	-375.41** (191.58)	-1217.8*** (395.44)	-578.94 (429.16)	-831.22 (2342.54)	-731.98 (468.62)	149.56 (462.88)	-827.20*** (224.35)
Age	13.77 (8.31)	31.05 (23.03)	10.02 (8.66)	120.54 (64.89)	72.59** (31.66)	-57.38 (53.74)	-46.08 (38.35)	60.19 (166.95)	-4.99 (13.54)	51.92 (22.94)	13.24 (11.10)
Construction	-501.25 (971.70)	-841.01 (3499.36)	-468.57 (961.27)	-364.35 (221.57)	-708.21 (1170.82)	146.43 (1998.23)	-572.63 (1853.36)	-998.27 (1138.24)	-	-	-
Industry	178.16 (975.62)	-959.44 (3450.62)	437.49 (968.65)	-119.39 (194.22)	-731.64 (1173.82)	1282.52 (2009.08)	333.81 (1865.56)	-349.07 (2497.3)	-	-	-
Service	241.75 (963.71)	27.45 (3429.86)	216.09 (954.65)	-	-403.54 (1158.86)	1112.52 (1982.44)	324.75 (1841.35)	-	-	-	-
Number of affiliates	-0.03*** (0.006)	-0.04* (0.02)	-0.02** (0.006)	-0.009 (0.005)	-0.02*** (0.01)	-0.03** (0.001)	-0.02 (0.01)	0.90*** (0.17)	-0.07** (0.03)	0.32* (0.18)	-0.02*** (0.006)
Constant term	4750.17*** (1057.11)	3341.11 (1012.86)	3771.36*** (1538.49)	838.08 (1510.82)	3150.9** (3003.54)	7833.97*** (2751.99)	7694.11*** (11435.13)	655.31 (973.21)	5614.37*** (1212.91)	1957.37 (546.24)	5259.2 (546.24)

Bold type indicates the estimated parameters. Standard errors are shown in italic in parentheses. *, **, and *** are used to indicate coefficients' statistical significance at the 10%, 5%, and 1% levels, respectively

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CA is the major contributor in writing and correcting the manuscript. CA and NT both decided the method used in the study and assisted in its application, and both read and approved the final manuscript.

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The data that support the findings of this study are available from the National Social Security Fund, but restrictions apply to the availability of these data, which were used at our request for the current study, and so are not publicly available. Data are, however, available from the authors upon reasonable request and with permission of National Social Security Fund.

Declarations**Competing interests**

The authors declare that they have no competing interests.

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