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# Micro-econometric evaluation of subsidized employment in morocco: the case of the "Idmaj" program

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## Abstract

This paper aims to assess the impact of the Moroccan wage subsidy program "Idmaj". It applies the propensity score matching method to the data from a survey conducted by the Ministry of Labour on a sample of eligible individuals. Our results suggest that wage subsidies in Morocco have a positive but marginally significant effect on reducing unemployment and improving employment and a significant negative impact on wages. It also highlights some heterogeneous effects of the program, particularly on women. Finally, it appears that the program did not serve as a stepping stone to higher-paying, high-quality work and, in contrast, it had a stigmatizing effect on beneficiaries.

**Keywords:** Propensity score matching, Impact evaluation, Active labour market policy, Wage subsidies

**JEL Classification:** C14, C31, H43, J38, J68

## 1 Introduction

Active labour market policy (ALMP) programs are usually classified into three categories (Card et al. 2010). The first one includes training programs that aim to improve employee's skills. The second encompasses job search assistance and job-matching schemes. The last one relates to wage subsidies, both those provided to employees to reduce inactivity traps and those provided to employers to reduce the costs of hiring. These subsidies, which are based on long-standing theoretical arguments (Kaldor 1936), have been used extensively by developed countries since the 1980s, before they were popularized in developing countries (Auer et al. 2005). The aftermath of the last financial crisis, the persistence of mass unemployment and the inevitable process of labour automation are all recent trends that have given new impetus to wage subsidies as a primary tool of ALMP (Banerji et al. 2014).

However, the available literature about their effectiveness provides mixed evidence. The recent meta-analysis show positive effects (Yeyati et al. 2019), but the

unconditional average magnitude of these effects remains low (Kluve et al. 2019). The assessment is even more pessimistic according to other meta-analysis that reveal a negative impact, at best zero, on beneficiaries' employment and income (Card et al. 2018). For developing countries, the evidence on the effectiveness of ALMP programs still sketchy (Grimm and Paffhausen 2014), due to the limited number<sup>1</sup> of rigorous impact evaluations (McKenzie 2017). For example, in the very influential meta-analysis of Betcherman et al. (2004), which covers 159 studies, there are only 39 evaluations from developing and transition countries, of which only 4 drew on randomized experiments.<sup>2</sup> Moreover, the findings of the few existing evaluations should be taken with caution, as the found effects vary across intervention' type and depending on the group of beneficiaries and country context (Cho and Honorati 2013). Therefore, additional studies assessing

<sup>1</sup> Among the main meta-analyses in developing countries, we can cite: Cho and Honorati 2013; Grimm and Paffhausen 2014; Blattman and Ralston 2015; McKenzie 2017; Escudero et al. 2019.

<sup>2</sup> Only one of which (Galasso et al. 2004) was published in an academic journal (McKenzie 2017).

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the effectiveness of wage subsidies in developing countries are of crucial importance.

The case of Morocco, where the available labour factor seems to be strongly under-used and inefficiently allocated, is an excellent example in this perspective. The unemployment rate has exceeded 10% on average over the last 20 years, with 70% are long-term unemployed, 60% are first-time job seekers, and the employment rate is now only 40%. The high weight of graduate unemployment, which is five times higher than that of without diploma people, as well as that of informal employment, unpaid employment and underemployment, which represent respectively 27%, 18% and 10% of the total employment, reveal, moreover, the suboptimal use of the available labour force (Haut-commissariat au plan & World Bank 2017). This situation has occurred despite the implementation, particularly since the beginning of the 1990s, of an ambitious ALMP, which includes, among other governmental programs, a wage subsidy scheme, called "Idmaj". Unfortunately, none of these public programs has been evaluated,<sup>3</sup> and our knowledge about their effectiveness is still very limited.

Therefore, this paper seeks to fill this gap by estimating the causal effect impact of the "Idmaj" Program using the propensity score matching method. It contributes to the available literature on subsidized employment in four ways. First, as counterfactual evaluations outside the OECD are quite limited, it provides evidence on the experience of developing countries. Second, while the available literature focuses more on schemes acting on either the demand or the supply side of the labour market and targeting low-skilled individuals, this paper examines one particular program that affects the both sides of the labour market and targets, as many countries in the MENA region (Groh et al. 2012, 2014; Broecke 2013; Premand et al. 2016; Souag 2020), higher degree graduates. Third, it goes beyond the program's direct impacts on employment to capture its effects on beneficiaries' wages and their working conditions. Finally, it highlights the heterogeneous effects of the program.

The rest of the paper is organized as follows: Sect. "2" presents a review of the literature. Section "3" presents the "Idmaj" program. Propensity score matching estimation methodology and empirical implementation are discussed in Sect. "4". Section "5" provides details on the

data used. Section "6" presents and discusses the empirical results. The final section presents the conclusions, policy implications and limitations of this paper.

## 2 Literature review

The available literature shows that the effectiveness of wage subsidies is very heterogeneous and depends, among other factors, on their design arrangements, the modalities of their implementation, the targeting of their beneficiaries, their expected outcomes, the market labour functioning, as well as the positioning of countries in the economic cycle (Card et al. 2010; Almeida et al. 2014; Gautié 2015). Nevertheless, three consensual conclusions deserve to be highlighted.

First, subsidies provided to firms for reducing their cost of hiring tend to produce positive results compared to those offered directly to the unemployed (Venetoklis 2004; De Mel et al. 2010, 2016; Bruhn 2016). Secondly, the quasi-experimental methods produce higher effects than those of the experimental ones (Kluve 2010; Grimm and Paffhausen 2014). This may partly explain why these subsidies are relatively more effective in developing countries than in developed countries (Betcherman et al. 2004; Kluve et al. 2017). Indeed, as experiment evaluations are rare in developing countries (Mckenzie 2017),<sup>4</sup> the few existing evaluations use mostly quasi-experimental methods (Galasso and Ravallion 2004; Broecke 2013; Souag 2020). Thirdly, most authors have concluded that the impact of these subsidies was limited (Escudero et al. 2019; Kluve et al. 2019). Betcherman et al. (2004) report, for example, that of the 159 evaluation studies reviewed, more than two-thirds had a negative effect on employment and only 5 studies had a positive effect on the income of beneficiaries.

The available literature has shed light on several collateral effects of wage subsidies that can explain their limited effectiveness. Their potential stigmatizing effect has, indeed, highlighted by the first experimental evaluations in the United States. Burtless (1985) has shown that these subsidies have been used by American employers as a discrimination tool against beneficiaries, who were less likely to find a job than non-beneficiaries. Similarly, other authors have shown that beneficiaries have concealed their eligible status because they considered it degrading and stigmatizing (Woodbury and Spiegelman 1987;

<sup>3</sup> Such evidence is also rare even for programs developed by civil society or international organizations, which are with limited scope and targeted generally narrow local individuals. In this respect, the paper of Bausch et al. (2017) is an exception. This paper has examined the impact of a skills training program, called "100 Hours to Success", on the financial behaviour, employability and educational choices of the rural young living in Morocco's Oriental Region.

<sup>4</sup> However, there are some recent signs that things are changing. For instance, in Morocco, the first and, to our knowledge, the only experimentation related to the labour market is Bausch et al. (2017). Experiments recently developed in the other countries of the MENA region (Groh et al. 2012; Groh et al. 2014; Premand et al. 2016) have also not focused on the mechanism discussed here, namely wage subsidies. For the latter, the experiment of Galasso et al. (2004) on the Argentine program "Proempleo" is one of the rare exceptions in developing countries.

Dubin and Rivers 1999). This stigma effect has also been verified in other countries, both developed (Bell et al. 1999) and developing (Kluve et al. 1999).

Likewise, several studies have shown that these subsidies are likely to produce some spillover effects that reduce their effectiveness (Martin and Grubb 2001; Kluve et al. 2017; Escudero et al. 2019). When it comes to the wind-fall effect, it has been shown that wage subsidies mainly help those who, even in the absence of the program, would have found a job in both developed (Katz 1996; Bell et al. 1999; Crépon et al. 2013) and developing countries (Galasso et al. 2004; Broecke 2013). The substitution and displacement effects have been also verified by several works (Dahlberg and Forslund 2005; Crépon et al. 2013; Moczall 2014). The size of these effects depends on the methods used. It seems that it is larger in econometric studies (60–70%) than survey studies (15–40%) (Calmfors et al. 2002).

Furthermore, many studies have focused on the permanence of the effects of wage subsidies. However, except few papers that have validated the stepping stone effect to stable, better-paying jobs (Pallais 2014), the general trend of these studies shows that the positive impact of these subsidies declines over time (Hujer et al. 2004; Venetoklis 2004; Card and Hyslop's, 2005; Kvasnicka 2009; David and Houseman 2010; Groh et al. 2016; De Mel et al. 2016).

Finally, the existing literature has highlighted the heterogeneous effects of wage subsidies by subgroups of participants. For example, Galasso et al. (2004) concluded that the "Proempleo" program was significant only for women, youth, and highly educated workers. The positive impact on women is corroborated by many studies (Bergemann and Van den Berg 2008; Groh et al. 2016). Other works have found heterogeneous effects depending on both gender and areas. This is the case for example of that of Caliendo et al. (2008), for the German scheme and that of Souag (2020) for the Algerian one. By sectors of activity, Stephan (2014) detected a little heterogeneity of the German program.

### 3 Description of the "Idmaj" program

In 2000, the active labour market policy in Morocco took a qualitative step forward with the creation of the National Agency for the Promotion of Employment and Competencies (ANAPEC<sup>5</sup>). This public agency is designed to (i) implement active labour market policies (ALMPs) (ii) to connect employers to job seeker, and (iii) to provide information and guidance to job seekers and young entrepreneurs. Not far, three main programs were set up in 2006. The first, called "Taehil", aims to improve

the match between the profile of job seekers and the needs of the market, through contractualized training, skills training or retraining. The second program, called "Moukawalati" and renamed "self-employment", aims to promote entrepreneurship and business creation through training and financial assistance. The third program, the subject of this paper, is a subsidized employment program which supports the transition of youth from school to work through company placements.

This program, called "Idmaj" or "insertion", has been designed to reach a double objective. Firstly, the improvement of the employability by offering to the targeted unemployed a professional experience through 24-month internships. Secondly, the increase of the share of high-skilled and of qualified employees by giving incentives for firms to hire the young graduates. Indeed, it is an employment subsidy targeting higher education graduates, as the individuals who are eligible for it are all job seekers registered with ANAPEC and holders of a higher (tertiary) education diploma, vocational training diploma or a baccalaureate at least.

Two types of contracts are offered under the "Idmaj" program: the insertion contract (IC) and the professional integration contract (PIC). Both are a tripartite contract between (i) a company interested in hiring an eligible job seeker (ii) an eligible job seeker and (iii) the ANAPEC, which is responsible for validating and following up these contracts.

The IC, put in place from the start of the program, provides to private companies involved in the program total exemption from (i) Income Tax, (ii) Social Charges and (iii) Tax on Vocational Training for the internship allowance paid to eligible individuals up to a ceiling of 6000 MAD (Moroccan Dirham), for a period of 24 months. Two other incentive measures were added in 2016. This concerns, on the one hand, the payment by the Government of employer's and employee's contributions for basic compulsory health insurance during the internship period and, on the other hand, the extension of the aforementioned tax and social exemptions for an additional year, if the trainee is integrated under permanent employment (PE) contract.

For its part, the PIC, which was put in place in 2011, completes the IC by providing an integration training subsidy (bonus) amounting to 25,000 MAD to companies recruiting eligible graduates under (PE) contract at the end of a 6 to 9 months integration training course as part of the system of the ICs. However, it is worth noting that the PIC is reserved for specific job seekers who have great difficulties finding their first job, namely young graduates of some general higher education courses (baccalaureate + 3 and more) enrolled at ANAPEC for at least 1 year.

<sup>5</sup> Abbreviation used in Morocco in reference to the initials of the name of the agency in French: Agence Nationale de Promotion de l'Emploi et des Compétences.

That being said, the "Idmaj" program remains the central component of ALMP in Morocco. Actually, by the end of its start-up year (2006), the number of beneficiaries was 32,880 young graduates, before it rises steadily to over 102,773 in 2018. This increased number of beneficiaries merely reflects the budgetary cost of the program and cannot be understood as a sign of effectiveness, which involves identifying the changes observed in beneficiaries that are attributable exclusively to the program. Such is the purpose of this paper.

#### 4 Methodology and empirical implementation

This paper uses the standard econometric evaluation model, Roy Rubin's model of potential outcomes (Roy 1951; Rubin 1974), to determine the causal effect of the "Idmaj" program on our outcome variables. In particular, it seeks to estimate the Average Treatment on Treated (ATT) parameter, which is given by:

$$ATT = E(Y^1|D = 1) - E(Y^0|D = 1) \quad (1)$$

with  $D \in \{0, 1\}$  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  $Y^0$  the outcome in case of non-treatment.

As  $E(Y^0|D = 1)$  is not observable, and taking into account the absence of an explicit rule of assignment to the "Idmaj" program and that there is no instrument or discontinuity in treatment to exploit, we use in this paper the matching method, which permits us to identify our ATT under the following assumptions<sup>6</sup>:

$$(Y^1, Y^0) \perp D | X \quad (2)$$

$$0 < \Pr(D = 1|X) < 1 \quad (3)$$

<sup>6</sup> Certainly, the observable average outcome of the untreated could be used as a credible counterfactual for this non-observable outcome in randomized experiments, nevertheless in the presence of non-experimental data, as in this paper, this would lead to a selection bias. For this purpose, different estimating strategies are developed (Heckman et al. 1999) to avoid this bias, which comes from both observable and unobservable factors. The feasibility of each of these strategies is based on some assumptions, which in turn depend on the nature of the program and its context. For example, the regression discontinuity (Imbens and Lemieux 2008) is suitable for programs using an index to decide who is eligible to enrol in the program and who is not. The instrumental variables method (Angrist et al. 1996) which relies on some external source of variation to determine treatment status is suitable mainly for programs with imperfect compliance, or universal coverage. Unlike these two non-experimental methods which produce estimates of the counterfactual through explicit program assignment rules, other methods, such as the difference-in-differences and the matching methods, can be used for programs with voluntary enrolment, when the program assignment rules are less clear or when none of the former methods is feasible.

The hypothesis in (3), known as conditional independence (Lechner 1999) or selection on observables (Heckman et al. 1985), assumes that there is no difference between treated and untreated groups, conditionally to the observables (noted X). The hypothesis in (4) implies the existence of an overlap (common support) between these two groups. Rosenbaum and Rubin (1983) call the combination (3) and (4) the "strong ignorability" hypothesis, which is the identifying hypothesis of ATT, since it verifies:

$$E(Y^0|X, D = 1) = E(Y^0|X, D = 0) = E(Y^0|X) \quad (4)$$

However, when the number of X is large, a "Curse of dimensionality" (Heckman et al. 1997) could affect the width of the common support. To overcome this problem, Rosenbaum and Rubin (1983) proposed to match treated and untreated individuals not on the basis of X but based on the propensity score  $p(X)$ , which defined as the probability of receiving the treatment giving X. Its balancing property ensures that treated and untreated persons with the same value  $p(X)$  also have the same distribution of X. These authors have also illustrated that while treatment assignment is strongly ignorable given X, it is also ignorable given  $p(X)$ . Therefore, we have:

$$\Pr(X|D = 1, p(X)) (Y^1, Y^0) \perp D | p(X) \quad (5)$$

$$0 < \Pr(D = 1|p(X)) < 1 \quad (6)$$

Once these conditions are satisfied, all biases due to the observables may be eliminated, allowing us to estimate the ATT according to the following general formula<sup>7</sup>:

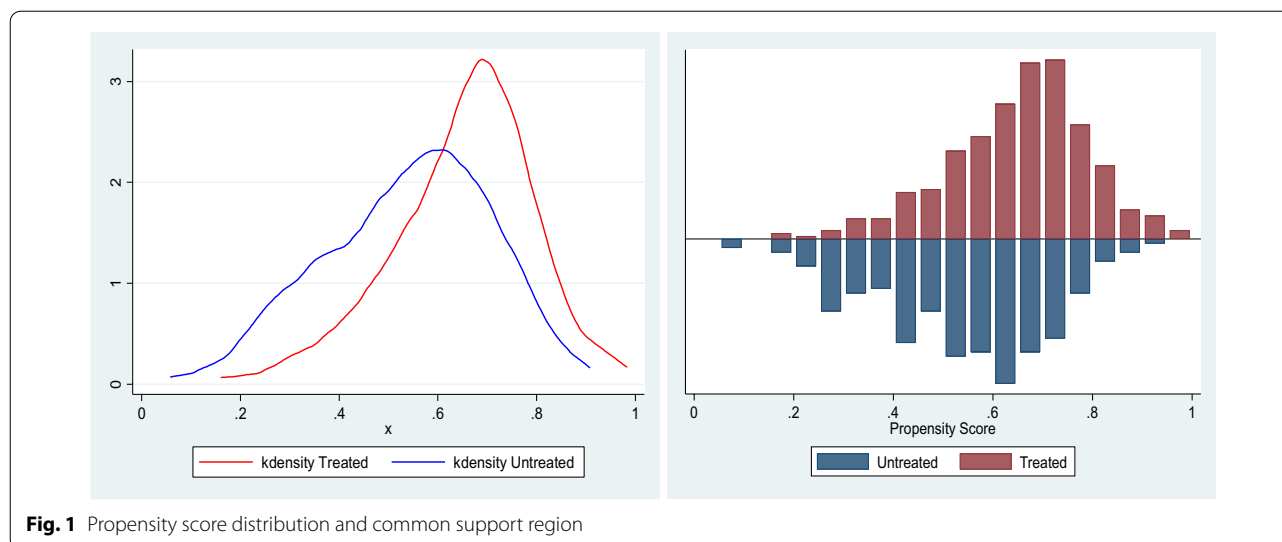
$$ATT : \frac{1}{N_T} \left[ \sum_{i \in T} Y_i^T - \sum_{j \in C} \omega(i, j) Y_j^C \right] \quad (7)$$

with:  $N_T$  The number of treated,  $Y_i^T$ : The observed outcome of the matched treated,  $Y_j^C$ : The observed outcome of the matched untreated and  $\omega(i, j)$  is the weight used to aggregate outcomes of the matched untreated.

Estimating the ATT expressed in (7) above involves first the prediction of the propensity scores with any discrete choice model can be used. In this paper, we use the "Probit" model.<sup>8</sup> The second step of our strategy consists

<sup>7</sup> It is to highlight that there is another method, which is based directly on the propensity score. This is the inverse probability of treatment weighting (IPTW) popularized by Hirano et al. (2003).

<sup>8</sup> It is worth noting that both this model and "logit" model allow consistent estimation of the conditional probability of participation in the program in the interval [0–1]. These two models generally yield similar results: estimates from a "logit" represent  $\pi\sqrt{3}$  of those obtained with a "probit".



of the choice of an appropriate matching estimator, being underlined that many popular matching estimators are suggested in the literature (nearest neighbor, caliper, kernel and stratification...). Although they share the same Eq. (7) for calculating ATT, these estimators differ in both the definition of the neighbourhood for the treated individuals and in the way that weights are assigned to those neighbors (Stuart 2010). When it comes to choosing the best estimator, the available literature offers very little guidance (Huber et al. 2013) and argues that there is no "winning" estimator (Caliendo and Kopeinig 2008), so their performance depends above all on the data set (Zhao 2003). Furthermore, it asserts that the choice of the matching estimator requires evaluating tradeoffs between efficiency and bias (Garrido et al. 2014).

Therefore, the kernel matching algorithm developed by Heckman et al. (1997) seems to be the most appropriate in the context of this paper due to the smallness of our sample. This matching approach maximizes the estimates' efficiency and precision using more observations. Contrary to other algorithms that use one (nearest neighbour) or at best a few observations from the comparison group (calliper matching), Kernel matching estimator constructs the counterfactual by using for each treated unit, all the untreated units weighted by the distance that separates each of them from the treated (Morgan and Harding 2006). Thereby, weights are assigned so that less similar units receive less weight when estimating ATT, and vice versa (Handouyahia et al. 2013).

This matching requires, moreover, the choice of a kernel function, and more importantly, the choice of a bandwidth that controls the degree of smoothing applied to the data. In this paper, we used the Gaussian kernel function and the default bandwidth of 0.06 which may

optimize the tradeoff between variance and bias (Garrido et al. 2014; Heckman et al. 1997).

That being said, using this matching for estimating our ATT depends on its ability to verify both common support region and balancing properties. Figure 1 shows the existence of a sizeable overlap of [0.2–0.8]. Likewise, our tests, in Table 2, confirm that the balancing property is also satisfied.

As a final step in our methodological approach, we conduct a sensitivity analysis of the results obtained. As noted previously, the propensity score matching method relies on conditional independence, a strong assumption which assumes that program uptake is based entirely on observed characteristics (Khandker et al. 2009). So if any unobserved factors exist and affect participation status and the variable of interest, then a hidden bias is involved (Rosenbaum 2002). In this respect, and after estimating the ATTs, we will check their sensitivity to deviation from the identification assumption, using the MH bounds program dedicated to binary variables according to the bounding approach proposed by Robensuam (2002) and explained in the paper of Becker and Caliendo (2007). This allows highlighting the degree by which an unmeasured variable influencing the odds of participation in "Idmaj" program will also modify its effects on our outcome variables.

## 5 Database

The data used here are taken from a random survey conducted in 2010 by the Ministry of Labour in coordination with the ANAPEC, as part of the strengthening of observation and analysis capacities of the Moroccan labour market. Its objective was to provide an accurate description of the socio-economic situation of the interviewees

and appreciate, in a descriptive way, the effect of the "Idmaj" program on their professional trajectories. While it was not completely designed for impact evaluation purposes, this survey fulfills three characteristics that, according to the available literature, support the estimation of the causal effect by the matching method (Heckman et al. 1998). First, it uses the same data source and, therefore, measures the observed characteristics in the same way for treated and untreated groups. Second, it is specific only to eligible individuals, which may alleviate the problem of determining a «common reference date» for treated and untreated individuals (Lechner 1999). Third, it contains a rich set of covariates, which sustains the plausibility of the conditional independence hypothesis discussed above.

This survey focused on two samples constituted by systematic random sampling with equal probability from (i) a nominative list of beneficiaries of "Idmaj" insertion contracts in 2006 and 2007, and (ii) a list of job seekers enrolled in ANAPEC, eligible for the program but never having benefited from it since their enrollment until the day of the survey.<sup>9</sup> The retrospective questions of this survey aimed to collect information on activity situations of interviewees during the following four phases: (i) before registering with ANAPEC, (ii) between registration and signature of the IC, (iii) during the IC period and (iv) the post IC period.

After the sampling, the survey was conducted on a sample of 2500 beneficiaries and 500 individuals for the control group. This paper uses a data of random subsample of a total size of 879 eligible individuals for the program, which 627 beneficiaries in 2006 or 2007 and 252 non-beneficiaries.<sup>10</sup>

However, some choices seemed essential to improve the coherence and quality of the data. Thus, we chose, in this paper, only one reference year for the program. This choice was necessary to construct some variables on the same basis<sup>11</sup> and compare the two groups at similar time horizons. It was also more appropriate, as we had no way to decompose the control group, which is half the size of the treatment group, to evaluate both years simultaneously. In addition, while data indicate that 21% of the untreated were enrolled in ANAPEC until 2007 and thus

only became eligible for the program, using this year as the baseline seems more reasonable.<sup>12</sup>

We also excluded variables that do not jointly cover beneficiaries and non-beneficiaries. Finally, for the outlier and the missing values, and due to the small size of our sample, we created an additional modality "non-response" for qualitative variables with too many missing observations. Likewise, and considering the bias that it can produce, the imputation by the mean has only been used for the three variables which suffer from few missing data or outliers. These variables are: "Reservation wage", "Mother's level of education", and "Father's level of education".

All these choices have affected the size of our final sample, which ended up with 621 individuals, including 377 treated and 244 untreated.

Regarding the covariates included in our estimate, they were chosen on the basis of a set of methodological considerations. First, the identification of ATT using the score propensity matching method implies, on the one hand, the inclusion of all covariates that influence simultaneously treatment and outcome variables and, on the other hand, the exclusion of covariates affected by treatment (Heckman et al. 1998). For this reason, and since our data are post-program, we have excluded variables<sup>13</sup> that are not fixed overtime at the risk of being affected by treatment, yet the parents' profession and their level of education will be kept, both because of their importance in explaining participation in the program, as well as in labour market insertion (social capital) and because they are difficult to change over time. Secondly, to choose the most relevant variables, we have proceeded to an iterative selection of our variables according to a process guided by three references: (i) the significance of the statistical tests, (ii) the quality of the matching, which involves verifying the existence of the common support and the balancing condition between treated and untreated, and (iii) the empirical literature suggestions, according to which one should integrating variables that capture the four following dimensions: eligibility criteria, socio-demographic characteristics, qualifications and labour market history (Heckman et al. 1999).

Therefore, our final specification includes 23 covariates belonging to the four above-mentioned dimensions: eligibility criteria (diploma and years of enrolment in ANAPEC), socio-demographic characteristics (program entry age, gender, health problems,

<sup>9</sup> The survey contains another sample of companies whose results are not used in this work.

<sup>10</sup> Not having been able to access the global sample, this sub-sample made available to us by the Ministry of Labour was, at our request, drawn randomly.

<sup>11</sup> Since data are post-program, it was necessary to retain some variables at program entry to predict propensity scores. For example, the calculation of age and seniority of enrollment in ANAPEC at the start of the program was feasible for treated individuals, but for those untreated will require the setting of a single reference year to allow their matching with the treated.

<sup>12</sup> The choice of 2006, instead, will reduce the size of the control group, which is already limited.

<sup>13</sup> The excluded variables are: marital status, number of children, number of non-resourceful persons in the household, type of housing, region, and household size.

**Table 1** Variables construction

Variable	Description
Years of enrolment in ANAPEC	In years
Program entry Age	In years
Health problems	1: has a health problem, 0 otherwise
Reservation wage	En MAD
Internship	1: trainee before enrollment at ANAPEC; 0 otherwise
Diploma Perception	1: positive perception, 0 otherwise
Training days	Number of training days from graduation to the enrollment at ANAPEC
Gender	1: man; 0 woman
Mother's job	1: in employment or retirement, 0 otherwise
Father's job	1: in employment or retirement, 0 otherwise
Extracurricular activity	1 if yes, 0 otherwise
Mother's level of education	In Years
Father's level of education	In Years
Studies	1 in education before the enrollment at ANAPEC, 0 otherwise
Employment	1 in employment before the enrollment at ANAPEC 0 otherwise
Associative activities	1 if yes, 0 otherwise
Duration of unemployment	In days (from graduation to the enrollment at ANAPEC)
Education sector	1: public, 0 otherwise
Unemployment	1: unemployed before enrollment at ANAPEC, 0 otherwise
Diploma	In years
Duration of other inactivity	Number of days spent in inactivity (other than internship and studies)
Internship days	Number of internship days from graduation to the enrollment at ANAPEC
Other forms of inactivity	1: inactive before ANAPEC enrollment, 0 otherwise

mother's and father's level of education and their jobs), qualifications (last individual's professional situation before enrolling in ANAPEC: employment, unemployment, internship, study or other types of inactivity), and labour market history (duration of studies, unemployment, internship and other types of inactivity experienced by the individuals from the time of their graduation until their registration with ANAPEC). We have, moreover, integrated the following variables that are likely to capture some forms of unobservable individual heterogeneity: diploma perception, reservation wage, participation in extracurricular and associative activities.

Tables 1 and 2, present respectively, our variables and the tests of difference in means. These tests show in particular that, before matching, treated and untreated groups are statistically different only in terms of four variables, which are age, years of enrolment in ANAPEC, reservation wage, and health problems. After matching, these tests confirm, as mentioned above, that our specification satisfies the balancing property. For its part, Table 3 reports the results of the propensity score estimation.

## 6 Results and discussion

As mentioned above, the aim of this paper is to assess the effectiveness of the "Idmaj" program not only with regard to its direct expected outcomes, which is improving the employability of its beneficiaries, but also with regard to the quality of the job held. Therefore, we have estimated the ATT of wage subsidies granted under the "Idmaj" program on five types of outcomes: (i) status with regard to unemployment, (ii) status with regard to employment, (iii) the level of salary, (iv) the benefit or not of social cover, and (v) the number of hours worked per week. These outcome variables are all binary, apart from that of the number of hours worked per week and the earned wage. The latter is unconditional on wage employment. Thus, the employment (respectively unemployment) result variable takes the value 1 if the individual finds a job (does not find a job) and 0 otherwise. It should also be noted that unemployment outcome variable is conditional on labour market participation (we have taken only the unemployed persons and excluded the inactive ones).

Table 4 contains the results of our estimates and provides ATTs for the whole sample and by subgroups constructed by gender and age.

**Table 2** Balancing covariates test

Variable	Mean (1)		Mean (2)		t-test (1)		t-test (2)	
	Treated	Control	Treated	Control	t	p>t	t	p>t
Years of enrolment in ANAPEC	1.932	2.617	1.935	1.982	- 6.130	<b>0.000</b>	- 0.550	0.582
Program entry Age	25.395	26.633	25.344	25.263	- 3.640	<b>0.000</b>	0.290	0.775
Health problems	0.046	0.013	0.046	0.026	2.270	<b>0.023</b>	1.430	0.153
Reservation wage	3152.400	2979.900	3148.800	3231.900	2.220	<b>0.027</b>	- 1.010	0.312
Internship	0.078	0.046	0.079	0.086	1.590	0.113	- 0.350	0.725
Diploma Perception	0.676	0.625	0.678	0.683	1.290	0.199	- 0.150	0.878
Training days	135.150	97.842	117.700	108.870	1.150	0.250	0.410	0.685
Gender	0.551	0.504	0.550	0.530	1.140	0.255	0.540	0.591
Mother's job	0.1	0.079	0.100	0.121	0.870	0.385	- 0.890	0.374
Father's job	0.873	0.842	0.873	0.886	1.090	0.276	- 0.540	0.590
Extracurricular activity	0.349	0.321	0.347	0.332	0.710	0.479	0.420	0.673
Mother's level of education	2.970	2.722	2.978	2.960	0.740	0.461	0.060	0.954
Father's level of education	6.745	6.480	6.760	6.681	0.690	0.493	0.230	0.816
Studies	0.105	0.121	0.106	0.096	- 0.590	0.555	0.430	0.667
Employment	0.116	0.1	0.114	0.114	0.620	0.532	- 0.020	0.987
Associative activities	0.068	0.058	0.068	0.075	0.450	0.649	- 0.390	0.694
Duration of unemployment	318.090	295.090	308.390	287.810	0.470	0.640	0.500	0.619
Education sector	0.114	0.129	0.114	0.131	- 0.580	0.561	- 0.720	0.473
Unemployment	0.530	0.512	0.531	0.533	0.420	0.678	- 0.050	0.963
Diploma	14.130	14.133	14.136	14.143	- 0.040	0.968	- 0.090	0.925
Duration of other inactivity	24.803	25.512	24.870	23.289	- 0.070	0.945	0.190	0.851
Internship days	33.151	32.362	32.252	29.357	0.090	0.928	0.400	0.686
Other forms of inactivity	0.059	0.058	0.060	0.073	0.060	0.954	- 0.740	0.462

Bold means that the variables are significant at 1% , 5% or 10%

\* Mean (1) before matching

Mean (2) after matching

Overall, our results show that the "Idmaj" program reduced the probability of being unemployed by 7.5% points and increased the chances of finding a job by 8.2 percentage points. However, this positive effect on beneficiaries is only significant at the 10% level. On the other hand, the program had a negative and statistically significant effect (at 1%) on wages of beneficiaries, which were lower by 487 MAD than those of non-beneficiaries. These results are consistent with those of Martin and Grubb (2001), who suggest that subsidies may produce positive effects but at the expense of wages. These findings may also reflect the stigmatizing effect of the program, and its use by the employers as a filtering tool, leading them to consider the participants to be unproductive and have to be paid lower wages than those otherwise hired. This negative impact on salaries reflects the ineffectiveness of the 24-month internship, which does not seem to have improved the skills and the productivity of the beneficiaries and, consequently, their chances to find good-paying and quality jobs. These conclusions imply that the "Idmaj" program does not have the expected stepping stone effect.

Furthermore, our results show that the "Idmaj" program provides some heterogeneous effects. The impact on the reduction of unemployment is only observed for women and young people under 24 years with 9.5 percentage points and 12 percentage points respectively. Similarly, only women have an improvement in their probability of finding a job (+ 11 percentage points). This positive impact on women is corroborated by the literature (Bergemann and Van den Berg 2008). Concerning the negative effect on wages, it was once more observed only among women, for whose the participation in the program caused them a loss of 697 MAD compared to non-beneficiaries.

While the global results do not appear a statistically significant effect of the program on the working conditions, the disaggregated analysis did reveal some valuable findings. For example, men were less likely to be covered by a social security system than non-treated (- 13 percentage points). This probability also decreases by (- 11 percentage points) among young aged 25-34 years. In addition, the latter beneficiaries had to work four hours longer than the non-participants. This did not seem, moreover,



**Table 3** Estimation of propensity scores (Probit Model: Marginal effects at the mean)

variable	dy/dx	Std.Err	Z	P>z	[95%Conf	Interval]	X
Years of enrolment in ANAPEC	- 0.071	0.017	- 4.240	<b>0.000</b>	- 0.104	- 0.038	2.202
Program entry Age	- 0.020	0.007	- 3.030	<b>0.002</b>	- 0.033	- 0.007	25.882
Health problems	0.281	0.072	3.920	<b>0.000</b>	0.141	0.422	0.033
Reservation wage	0.000	0.000	1.590	0.113	- 0.000	0.000	3084.58
Internship	0.215	0.079	2.730	<b>0.006</b>	0.061	0.369	0.066
Diploma Perception	0.063	0.046	1.380	0.166	- 0.026	0.153	0.656
Training days	0.000	0.000	1.410	0.159	- 0.000	0.000	120.47
Gender	0.060	0.043	1.380	0.168	- 0.025	0.144	0.533
Mother's job	0.054	0.078	0.700	0.487	- 0.099	0.208	0.092
Father's job	0.067	0.062	1.090	0.277	- 0.054	0.188	0.861
Extracurricular activity	0.022	0.046	0.480	0.632	- 0.068	0.113	0.338
Mother's level of education	- 0.005	0.007	- 0.650	0.518	- 0.018	0.009	2.872
Father's level of education	0.002	0.006	0.320	0.745	- 0.009	0.013	6.640
Studies	0.021	0.091	0.230	0.821	- 0.157	0.198	0.111
Employment	0.152	0.077	1.990	<b>0.047</b>	0.002	0.303	0.110
Associative activities	- 0.045	0.090	- 0.500	0.614	- 0.221	0.131	0.064
Duration of unemployment	0.000	0.000	1.450	0.148	- 0.000	0.000	309.038
Education sector	- 0.081	0.069	- 1.170	0.240	- 0.217	0.054	0.120
Unemployment	0.126	0.067	1.880	<b>0.060</b>	- 0.005	0.257	0.523
Diploma	0.025	0.022	1.160	0.247	- 0.017	0.067	14.131
Duration of other inactivity	0.000	0.000	0.530	0.597	- 0.000	0.001	25.082
Internship days	- 0.000	0.000	- 0.660	0.509	- 0.001	0.000	32.841
Other forms of inactivity	0.099	0.099	1.000	0.318	- 0.095	0.293	0.059

Bold means that the variables are significant at 1% , 5% or 10%

to be compensated by an increase in their chances of finding a job compared to non-beneficiaries. This result indicates that the stigmatizing effect of the "Idmaj" program is particularly significant among older youth, who must be long-term unemployed or with higher degrees, for which the statistics are already alarming. In Morocco, 70% of the unemployed are long-term unemployed, and unemployment rates for holders of higher degrees are almost five times higher than for those with no degree.

Our results suggest revisiting the program's parameters and making certain adjustments to increase its effectiveness. In this respect, particular attention should be given to the professional internship to make it a real lever for productivity gains, since only 2% of the beneficiaries in our sample report having received coaching from the host firm during the internship. It is, therefore, necessary to supervise this internship with more rigorous specifications aimed at ensuring real supervision of the trainees and the improvement of their skills. It must be accompanied by a reduction in its duration, since 24 months of internship is a relatively long period that can produce counterproductive effects. It would also be appropriate to empower beneficiaries by requiring them to participate in employability training. Indeed, it is widely recognized

that the impact of wage subsidies are more beneficial when accompanied by complementary services (Kluve et al. 2019).

Other conditionalities may also be useful to ensure that the program can produce lasting effects beyond the expiration of subsidies, such as the requirement to keep subsidized employees for a specified period. The tendency of employers to pay low wages to the beneficiaries can, on the other hand, be attenuated by more meaningful differentiation of the wage ceiling, which serves as the basis for tax and social security exemption.

Finally, our results support a more refined targeting of women and youth for whom the program has proven to be more effective. Indeed, there is ample evidence that careful targeting avoids the loss of funds and allows for rigorous monitoring of results, and that the effectiveness of subsidies is better when targeted to a specific group (Almeida et al. 2014).

Before generalizing these findings, we conducted a sensitivity test to check the quality of our estimates. While the raised impacts of the "Idmaj" program are significant (at the 10%) on unemployment (respectively employment), the sensitivity test will determine at what degree of presence of unobserved selection (Gamma)

**Table 4** The ATT estimates by Kernel Matching

Outcome	n. treated	n. control	ATT	T
The whole sample				
Unemployment	370	235	- 0.075*	- 1.832
Employment	370	235	0.082*	1.804
Wage	269	155	- 487.153***	- 2.480
Social protection	269	141	- 0.055	- 1.564
Worked hours per week	269	155	1.350	1.138
Women				
Unemployment	166	115	- 0.095*	- 1.892
Employment	166	115	0.112*	1.714
Wage	118	70	- 697.783*	- 1.955
Social protection	118	68	0.013	0.163
Worked hours per week	118	70	1.044	0.931
Men				
Unemployment	204	116	- 0.037	- 0.666
Employment	204	116	0.054	0.981
Wage	151	82	- 345.330	- 1.234
Social protection	151	71	- 0.135**	- 4.302
Worked hours per week	151	82	2.440	1.638
Youth [18–24]				
Unemployment	170	71	- 0.120*	- 1.746
Employment	170	71	0.100	1.290
Wage	124	41	- 408.998	- 1.131
Social protection	124	36	- 0.028	- 0.401
Worked hours per week	124	41	0.433	0.242
Youth[25–34]				
Unemployment	190	142	- 0.042	- 0.645
Employment	190	142	0.039	0.676
Wage	138	101	- 416.596	- 1.371
Social protection	138	93	- 0.115**	- 2.462
Worked hours per week	138	101	4.266**	2.363

\* t statistic; \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

these effects will become insignificant. Since the impact is negative on unemployment (positive on employment), the focus will be on the negative unobserved selection  $Q_{mh-}$  (positive unobserved selection  $Q_{mh+}$  for employment). The results in Table 5 affirm that in the absence of unobserved selection ( $\text{Gamma}=1$ ), the "Idmaj" scheme does have a significant effect at the 10% level ( $p_{mh-}=0.06$ ) on reducing unemployment/increasing employment. Then, the  $Q_{mh-}/Q_{mh+}$  statistic reveals that at relatively low levels of presence of unobserved selection ( $\text{Gamma}=1.1$ ), these effects will be non-significant ( $p_{mh-}=0.157$  for unemployment and  $p_{mh+}=0.153$  for employment). This analysis

**Table 5** Sensitivity test for unobserved heterogeneity

Gamma	Unemployment		Employment	
	$Q_{mh-}$	$P_{mh-}$	$Q_{mh+}$	$P_{mh+}$
1	1.49	<b>0.067</b>	1.54	<b>0.060</b>
1.1	1.00	0.157	1.02	0.153
1.3	0.154	0.438	0.097	0.461
1.5	0.380	0.351	0.512	0.304

Bold means that the variables are significant at 1%, 5% or 10%

Gamma: odds of differential assignment due to unobserved factors

$Q_{mh+}$ : Mantel-Haenszel statistic (assumption: overestimation of treatment effect)

$Q_{mh-}$ : Mantel-Haenszel statistic (assumption: underestimation of treatment effect)

$p_{mh+}$ : significance level (assumption: overestimation of treatment effect)

$p_{mh-}$ : significance level (assumption: underestimation of treatment effect)

suggests a cautious interpretation of the obtained results when both effects on unemployment and employment would no longer be significant if an unobserved variable increases the chances of program participation by 10% for two individuals with the same observable characteristics.

## 7 Conclusion, policy implications and limitations

This paper sought to assess the effectiveness of the subsidized employment program "Idmaj" not only in terms of reducing unemployment and promoting employment, but also in terms of beneficiaries' wages, working hours, and social security status. This evaluation is conducted using the propensity score-matching method based on the Ministry of Labor's survey of a sample of eligible individuals for the "Idmaj" program. Our results have significantly improved our knowledge of the effectiveness of the program; especially since none of Morocco's public ALMP schemes has been subject to a counterfactual impact evaluation.

Our results reveal that the marginally positive effects of the "Idmaj" program on reducing unemployment and increasing employment were accompanied by some significant collateral effects on beneficiaries. In particular, the program seems to have produced a stigmatizing effect. This were manifested through the negative and statistically significant impact on beneficiaries' wages, and, for some categories (notably young aged 25 to 34 years), on their working conditions as an increase in working hours and exclusion from social security coverage. Our findings also reflect the ineffectiveness of the 24-month internship provided by the program on the beneficiaries' skills and productivity and their chances of finding gainful employment. As a result, the program did not serve as a stepping stone.

Moreover, our results highlight some heterogeneous effects of the program. They showed a positive impact on the professional insertion of the most-excluded individuals in the Moroccan labour market, particularly women and young people aged between 18 and 24 years. However, the positive effect for women is obviated by their lower wages than they would have earned without the program. As for young people aged 25–34, they have to work more and with less social security when they benefit from the program.

These mixed and small effects suggest revisiting the "Idmaj" program to improve its effectiveness. Refining its targeting, rethinking its conditionalities and orienting them towards the sustainability of its impacts, strengthening its complementarity with other levers of the ALMP, and enhancing its flexibility are all adjustments that seem necessary to attenuate the negative effects of the program in question and increase its net benefit. Indeed, it would, for example, be more appropriate to replace the current single salary ceiling serving as the basis for tax and social exemptions by differentiated limits to reduce the employers' bias towards low wages. Likewise, for enhancing the 24-month professional internship impact on productivity, clear specifications and regular monitoring and evaluations should be put in place. The flexibility of this internship should also be increased, by allowing, for example, the employee to change his initial employer more than once if this would prove useful for improving his employability. More broadly, and as this wage subsidies program is used in Morocco not to address cyclical unemployment, but rather the structural one, employment-friendly growth and structural reforms of the labour market will be required to increase the employability of young graduates sustainably.

Finally, it should be mentioned that this paper is not without limitations and shortcomings. Indeed, as noted above, the design of the program whereby treatment exposure is not determined by some external selection criteria, such as a random allocation or an exogenous eligibility threshold, involved the use of the propensity score matching method based on the strong assumption of selection on observables. That said the scope of our findings would have been much more robust and interesting if relevant pre-treatment data were available for our two groups. Indeed, the post-treatment survey led us to exclude certain co-variables that are not fixed over time but potentially crucial for participation and outcomes. This has reduced the heterogeneity on the observables as long as program participation has been modelled based on a few statistically significant co-variables. These elements could explain the relative weakness of the statistical significance of our results and their relative sensitivity concerning unobservable factors. Another and no less

important limitation of this paper lies in the narrowness of our sample, in particular, that of untreated individuals which is, and contrary to the usual evaluation conditions, narrower than that of treated individuals.

#### Abbreviations

ALMP: Active Labour Market Policy; ANAPEC: Agence Nationale de Promotion de l'Emploi et des Compétences; ATT: Average treatment on treated; IC: Insertion contract; MAD: Moroccan dirham; PE: Permanent contract; PIC: Professional integration contract.

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#### Authors' contributions

CA is the major contributor in writing and correcting the manuscript. The three authors decided the method used in the study and assisted in its application. All authors read and approved the final manuscript.

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#### Availability of data and materials

The data used in the present study are available from the Moroccan ministry of employment, direction of the national observatory of employment. But restrictions apply to the availability of these data, which were used at our request for this study. Data are however available from the authors upon reasonable request and with permission of direction of the national observatory of employment.

#### Declarations

##### Ethics approval and consent to participate

Not applicable.

##### Consent for publication

Not applicable (the paper has used anonymized data, so no consent was obtained).

##### Competing interests

The authors declare that they have no competing interests.

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