

## Article

# Employment Subsidies and Job Insertion of Higher Education Graduates in the Labor Market

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**Abstract:** This paper uses data from the 24 governorates in Tunisia over the period 2012–2020 to study the relationship between job insertion of higher education graduates into the formal labor market and a number of independent variables, namely active labor supply, labor demand, an active labor market policy program (named the CIVP program), and the waiting time for job insertion. The balanced panel, which includes 216 observations for each variable, was the basis of different tests and estimations. The results of the tests allowed the assessment of a fixed effects model and a long-term relationship using FMOLS and VECM models. Results show that, in the long term, active labor supply and the CIVP program have positive effects on the job insertion of higher education graduates. In contrast, the results in the short term do not appear significant, with a negative effect of the CIVP program that reflects the fact that companies exploit most of the benefits of this wage subsidy program on job insertion before final recruitment. Using the ARDL model, the individual results by governorate show specific differences across areas.



**Citation:** Khayati, Anis, Umme Hani, Md Shabbir Alam, Nadia Sha, and Chokri Terzi. 2024. Employment Subsidies and Job Insertion of Higher Education Graduates in the Labor Market. *Economies* 12: 297. <https://doi.org/10.3390/economies12110297>

Academic Editor: Balázs Égert

Received: 25 July 2024

Revised: 10 October 2024

Accepted: 18 October 2024

Published: 30 October 2024



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**Keywords:** employment subsidies; active labor market policies; graduate unemployment; MENA region; Tunisia

**JEL Classification:** J08; J20; J64; J68

## 1. Introduction

Youth around the world typically face higher levels of unemployment, a situation that can have significant consequences not only for the youth themselves but also for society at large. In effect, youth employability is closely associated with sustainable development goals, notably quality education and the availability of decent and fulfilling jobs (Meramveliotakis and Manioudis 2021; Tomislav 2018; Redclift 2018).

According to the World Bank, in 2023 the unemployment rate reached 9.2% and 17.72% in the Middle East and North Africa (MENA) region and in Tunisia, respectively. Particularly, unemployment among university graduates has been a major economic problem in Tunisia for many years. This issue was one of the primary reasons that led to the Tunisian revolution in 2011 and then spread to other countries in the region as part of what is known as the Arab Spring. At that time, about one in four graduates in Tunisia were unemployed (Bousnina 2022). Even after the revolution, the unemployment rate among university graduates remained very high, reaching 23.7% in 2023 (Molini 2024). Due to social distancing policies and the decrease in economic activity, the COVID-19 pandemic affected the job

insertion of higher education graduates, and many of them resorted to the widespread informal sector, where social protection schemes are unavailable.

This high rate is a significant cause of social unrest, and the government has prioritized addressing this issue.

The causes of graduate unemployment in Tunisia are entangled and tied to numerous economic factors (Fitouri et al. 2024; Masmoudi and Ferchichi 2024; Khelifi 2022; Schaefer 2017). However, the primary issue is related to the supply and demand imbalance in the labor market (Belgacem and Vacher 2023; Assaad and Krafft 2023).

On the supply side, Tunisia has made considerable investments in education as a means of achieving economic growth. In fact, the country established free and compulsory public education in 1958, and higher education was based on quality. Therefore, the problem of graduate unemployment was relatively limited. In 1995, only 3.8% of university graduates were unemployed (Broecke 2013). Since the mid-1990s, the government has sought to raise the percentage of young people enrolled in higher education, which has led to its expansion at the expense of quality. Consequently, the number of graduates increased significantly from less than 12,000 in 1994 to approximately 61,000 in 2021, and the unemployment rate among university graduates rose to around 25%.

On the demand side, the feeble competitiveness of the economy in many sectors and the weak enterprise fabric in Tunisia (more than 95% are microenterprises) have resulted in few job opportunities, most of which are low-skilled (Karamti and Abd-Mouleh 2023; Adair et al. 2022). Meanwhile, the labor force has increased, including many young university graduates entering the labor market for the first time.

Addressing graduate unemployment in Tunisia will undoubtedly require a multi-faceted approach, including developing the private sector, increasing economic diversification, raising productivity, introducing reforms to education, and introducing a set of active labor market policies (ALMPs) to help graduates transition from higher education to the labor market.

This paper is related to the last type of policy. More specifically, the study examines the factors influencing job creation, including both labor supply and demand, as well as the CIVEP program (Contrat d'Initiation à la Vie Professionnelle, or Contract of Initiation to Professional Life; known as the SIVEP program before 2019), which is a wage subsidy program aimed at incentivizing employers to hire higher education graduates. The reason for choosing this program is that, compared to other labor programs, it is considered the most important and the most extensive program for the active labor market in Tunisia. In 2023, the CIVEP's national budget was approximately TND 181 million (about USD 60.3 million). The program's size has also proliferated, as the number of graduates benefiting from the CIVEP increased from about 45,000 in 2011 to over 98,000 in 2020.

Given the urgent need to address graduate unemployment in Tunisia and the importance of the CIVEP program in the government's employment strategy, evaluating the impact of this program on job insertion is important. In addition, although similar policies are used in other countries in the MENA region, the number of studies related to active labor market policies in these countries remains limited (Brik 2024; Barsoum 2021; McKenzie 2017) and most of these studies are either descriptive or based on surveys. In this paper, we employ database information to undertake a series of regression analyses using different estimation techniques.

The remainder of this paper is organized as follows. Section 2 presents a review of employment subsidies and their potency in creating job opportunities. It also emphasizes employment subsidy programs in Tunisia. Section 3 describes the data used and provides details on the model. Section 4 presents the empirical analysis and a discussion of the main findings. Finally, Section 5 concludes the paper.

## 2. Overview of Active Labor Market Programs

Recent decades have witnessed an increase in efforts to improve employment among youth through active labor market programs (Verick 2023; Al Ayyubi et al. 2023), including

various forms of employment subsidies. Employment subsidies can appear in different forms, such as direct wage subsidies and social security exemptions or deductions (Asik et al. 2022; Cerqua and Pellegrini 2022). They are designed to reduce the cost of hiring new employees, which in turn can lead to increased demand for labor (Elvery et al. 2023; Brown 2015). Employment subsidies are particularly important for recent graduates, who may face challenges in finding employment due to their perceived lack of experience (Sekerbayeva et al. 2024; McCracken et al. 2016). In Tunisia, the strength of labor unions makes it even more difficult for employers to adjust graduates' wages, which could further discourage them from hiring new graduates (Bouassida and El Lahga 2018). Given that the supply of graduates in the labor market far exceeds the demand, wage subsidies can help reduce the cost of hiring young graduates and make them more attractive to employers, thereby increasing the demand for work in the formal labor market.

The literature on employment subsidies shows they can have positive or negative effects (Desiere and Cockx 2022). In general, most studies find that the effects of employment subsidies are positive, albeit modest (Kluve et al. 2019).

In effect, wage subsidies can lead to financial losses due to subsidizing jobs that could have been created without the subsidy (Betcherman et al. 2010). Additionally, they may lead to employment substitution effects by hiring subsidized workers instead of unsubsidized workers without a positive net effect on employment (Robertshaw 2022). Therefore, wage subsidies may appear to be a waste of money from the overall labor market's outcome perspective.

In contrast, several wage subsidy policies are thought to have had positive effects on employment, such as the Proempleo program in Argentina (Bagga et al. 2023), the New Deal for Young People (NDYP) in the UK (Smith and Weil 2017), and the Work opportunity Tax Credit (WOTC) in the US (Ajilore 2012).

Generally, the effectiveness of labor programs depends largely on their properties and on whether subsidies are combined with other labor policies such as training, counseling, and job search assistance (Vooren et al. 2019). To limit losses, subsidies often target specific subgroups, such as the long-term unemployed or higher education graduates. However, excessive targeting may lead to an administrative burden in the monitoring process (Bredgaard 2018).

Also, some studies argue that employment subsidies are more effective when used for short periods, especially as countercyclical tools (Cronert 2019). This is because they are relatively flexible and can be expanded whenever required. However, governments may continue to implement employment subsidies even if they are not effective at the level of job creation due to their important social dimension.

In the MENA region, particularly in Egypt, ALMPs can have strong results on employment and income, especially for the most disadvantaged populations (Elsayed et al. 2018). Moreover, while training interventions could help women achieve economic empowerment, binding constraints arising from social norms could still hinder social empowerment in Egypt (Elsayed and Roushdy 2017).

Using a tracer survey of the 2004 graduating cohort in Tunisia, Broecke (2013) found that graduates who benefited from the employment subsidy program SIVP were more likely to find a job in the private sector. In contrast, in the case of Morocco, Chatri et al. (2021) found that the wage subsidy program named "Idmaj" had a stigmatizing effect on beneficiaries.

In Tunisia, there is a national employment strategy that aims to stimulate decent work by achieving growth in terms of productive and quality jobs, increasing the participation of youth and women in the labor market, promoting equality in access to employment, and reducing regional disparities in employment opportunities. However, this strategy has never been applied effectively, which explains the persistence of the unemployment issue (DTUDA 2024).

As part of the policy of promoting employment and professional training, the government created in 1993 the Tunisian Employment Agency (ANETI) under the supervision

of the Ministry of Vocational Training and Employment. ANETI's primary mission is to develop information on employment and professional qualifications, implement programs to promote the integration of young graduates, and provide the necessary support for job seekers.

In this regard, job seekers can benefit from various programs and mechanisms to improve their employability and facilitate their integration into the labor market. Employment incentive programs include, in addition to the CIVP, the Employment Program for Graduates of Higher Education (CIDES), the Reintegration Contract into Active Life (CRVA), the Labor Market Access and Employability Program (CAIP), and the Voluntary Civil Service (SCV).

Also, other programs designed to promote small businesses have been put in place, such as the Program for Small Businesses (PAPPE), the Business Creation and Entrepreneur Training Program (CEFE), Original Methods for New Ideas in Business (MORAINE), the Practical Internship Program (SPE), and the Self-Business programs, CREE and GERME,

Table 1 shows the evolution of the mentioned programs and the evolution of the main employment indicators according to the ANETI data. The data are for job seekers registered in ANETI regional offices and, therefore, concern only declared employment.

**Table 1.** Evolution of the main employment indicators and employment programs.

|                                         | 2010    | 2011    | 2012    | 2013    | 2014    | 2015    | 2016    | 2017    | 2018    | 2019    | 2020    |
|-----------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| <b>General Indicators of Employment</b> |         |         |         |         |         |         |         |         |         |         |         |
| Labor Supply                            | 604,327 | 802,353 | 864,744 | 735,933 | 619,969 | 701,676 | 789,927 | 657,543 | 625,612 | 582,074 | 488,028 |
| EMLS                                    | 121,730 | 281,218 | 273,461 | 202,507 | 169,215 | 175,491 | 192,383 | 162,030 | 116,052 | 106,068 | 284,399 |
| Labor Demand                            | 176,196 | 100,356 | 106,321 | 93,710  | 100,486 | 78,937  | 81,071  | 86,096  | 100,695 | 87,701  | 28,628  |
| Insertion                               | 123,421 | 46,468  | 53,643  | 58,165  | 61,484  | 55,374  | 49,460  | 49,667  | 55,633  | 51,133  | 38,970  |
| <b>Active Employment Programs</b>       |         |         |         |         |         |         |         |         |         |         |         |
| SIVP                                    | 45,245  | 45,018  | 55,723  | 62,924  | 65,668  | 60,837  | 63,742  | 58,799  | 61,677  | 79,277  | 98,551  |
| CIDES                                   | 3996    | 1018    | 276     | 100     | 120     | 143     | 151     | 104     | 109     | 75      | 102     |
| CAIP                                    | 34,954  | 37,629  | 40,458  | 36,645  | 36,780  | 30,678  | 34,593  | 39,881  | 41,333  | 30,630  | 32,562  |
| CRVA                                    | 750     | 621     | 359     | 451     | 482     | 384     | 237     | 161     | 101     | 40      | 37      |
| SCV                                     | 5901    | 6719    | 18,120  | 22,688  | 14,966  | 16,269  | 25,162  | 22,856  | 20,964  | 20,856  | 16,235  |
| <b>Small Enterprise Promotion</b>       |         |         |         |         |         |         |         |         |         |         |         |
| Financed Projects                       | 6793    | 3527    | 2167    | 2606    | 3564    | 4647    | 3707    | 3755    | 2462    | 3778    | 2500    |
| PAPPE                                   | 15,535  | 11,709  | 11,350  | 9969    | 12,896  | 13,196  | 14,686  | 13,592  | 13,219  | 13,311  | 7135    |
| CEFE                                    | 7570    | 6209    | 6080    | 5270    | 6140    | 6215    | 6393    | 5786    | 5236    | 5535    | 2435    |
| GERME                                   | 545     | 460     | 478     | 340     | 437     | 370     | 691     | 779     | 295     | 716     | 342     |
| MORAINE                                 | 2623    | 1493    | 1745    | 1504    | 2273    | 2669    | 3043    | 3080    | 3234    | 2890    | 1529    |
| SPE                                     | 840     | 650     | 651     | 660     | 656     | 408     | 387     | 241     | 212     | 167     | 112     |

Source: ANETI database (Available online at: <https://emploi.nat.tn/fo/en/global.php>, accessed on 15 July 2024).

It should be noted that the most important of all employment indicators is the End of Month Labor Supply (EMLS), observed on December 31 of each year and showing the current job supply. It is the most important because the registration system at ANETI offices is declarative. In effect, the EMLS reflects the total number of active job seekers who confirm their registration (check-in) at least once a month and, therefore, declare that they are still unemployed and looking for a job.

Table 1 shows that the EMLS increased significantly in 2011, the year of the Tunisian revolution. This is due to the fact that the ministries that opened numerous contests for

employment that year (and the years immediately after) required a certificate of registration at a regional ANETI office.

A gradual decline was then recorded between 2016 and 2019, before a remarkable increase, similar to that in 2011, occurred again in 2020. This was due to exceptional procedures for recruitment into public services that gave priority to candidates registered at regional ANETI offices, especially those who had been unemployed for at least ten years since their obtention of a higher education degree.

The labor demand experienced a general downward trend from 2011 due to the fall in economic activity in the aftermath of the revolution and reached its lowest level in 2020 due to the coronavirus pandemic.

Concerning active employment programs, the CIVP, which is the largest Tunisian program, has maintained an upward trend, explained by the fact that it is the most known by job seekers, and by the increase in the stipend granted by ANETI from TND 150 to TND 200, especially following a new regulation in 2019, which gave beneficiaries more chances of being inserted.

However, all programs for the promotion of small businesses have declined in general due to future uncertainty that has invaded young project promoters about the economic and political prospects in Tunisia.

### 3. Methodology

The econometric model adopted in this study aims to explain the job insertion of university graduates (JI) using the end-of-month labor supply (EMLS), the labor demand (LDM), the job insertion contract (CIVP), and the average waiting time (AWT) from registration at a regional ANETI office until the job insertion is made.

For this purpose, panel data for regional and temporal dimensions are estimated. The database is collected from ANETI to analyze the behavior of Tunisian governorates regarding labor insertion programs and the relationship with the main indicators of declared employment.

These data are for the 24 governorates for the period 2012–2020. This period ranges between the post-revolution stage and the outbreak of the coronavirus pandemic, during which all the required data were available.

All the variables are directly obtained from the ANETI database and the AWT variable is calculated by the authors.

The variables retained in the model are as follows:

- $JI_{it}$  is, for each governorate, the annual number of job seekers with higher education degrees registered with employment offices who were inserted in a company, either directly or following an active employment training program.
- $EMLS_{it}$  is, for each governorate, the annual number of job seekers with higher education qualifications who are registered in regional employment offices and who confirm their registration (check-in) at least once a month.
- $LDM_{it}$  is, for each governorate, the annual number of job offers submitted to employment offices by companies, reflecting their needs for labor among higher education graduates.
- $CIVP_{it}$  is, for each governorate, the annual number of beneficiaries of insertion contracts among job seekers with higher education qualifications.
- $AWT_{it}$  is the average waiting time (in months) necessary for job seekers with higher education qualifications and registered in regional employment offices to get inserted into the labor market.

The equation for the model is written as follows:

$$\ln JI_{it} = \alpha_0 + \alpha_1 \ln EMLS_{it} + \alpha_2 \ln LDM_{it} + \alpha_3 \ln CIVP_{it} + \alpha_4 AWT_{it} + \varepsilon_{it} \quad (1)$$

where  $i$  and  $t$ , respectively, represent the governorates and time periods,  $\alpha_i$  are the coefficients to be estimated, and  $\varepsilon_{it}$  is the error term.

#### 4. Empirical Results

The results in Table 2 show that the CIVP and the EMLS are the most dispersed variables. The Jarque–Bera statistic shows that not all variables are normally distributed. According to the skewness and kurtosis values, JI, CIVP, and LDM are strongly asymmetric and leptokurtic, while the other variables present a medium asymmetry and are rather platykurtic.

**Table 2.** Descriptive statistics (216 observations).

| Variables   | JI     | EMLS   | LDM    | CIVP   | AWT   |
|-------------|--------|--------|--------|--------|-------|
| Mean        | 708    | 3977   | 474    | 2797   | 34.66 |
| Median      | 290    | 3562   | 161    | 1610   | 34.36 |
| Maximum     | 5461   | 10,654 | 3205   | 17,410 | 40.07 |
| Minimum     | 14     | 508    | 2      | 103    | 29.50 |
| Std. dev.   | 942    | 2223   | 655    | 3124   | 2.27  |
| Skewness    | 2.58   | 0.69   | 2.07   | 2.24   | 0.08  |
| Kurtosis    | 10.56  | 2.97   | 7.26   | 8.56   | 2.17  |
| Jarque–Bera | 753.21 | 17.33  | 317.61 | 459.27 | 6.49  |
| Probability | 0.0000 | 0.0002 | 0.0000 | 0.0000 | 0.039 |

The matrix of correlations in Table 3 makes it possible to get an initial idea about the nature and intensity of the linear relationship between the retained variables. Table 3 shows that the dependent variable is positively related to labor demand and CIVP, and negatively related to the average waiting time.

**Table 3.** Correlation between variables.

| Variables | Ln JI | Ln EMLS | Ln LDM | Ln CIVP | AWT |
|-----------|-------|---------|--------|---------|-----|
| Ln JI     | 1     |         |        |         |     |
| Ln EMLS   | 0.22  | 1       |        |         |     |
| Ln LDM    | 0.86  | 0.22    | 1      |         |     |
| Ln CIVP   | 0.69  | 0.34    | 0.58   | 1       |     |
| AWT       | −0.52 | −0.01   | −0.67  | −0.20   | 1   |

##### 4.1. Preliminary Tests

In order to specify the appropriate estimation model, it is necessary to carry out a number of tests. These tests are important to avoid biased results and incorrect conclusions. They include the homogeneity test for the existence of fixed and random effects, the Hausman test to determine which model is more appropriate, the autocorrelation test, and the heteroskedasticity test.

##### Homogeneity–Heterogeneity Test

In a panel data sample, it is necessary to check the homogeneity or heterogeneity of data specification. The null hypothesis of this test is that “there is homogeneity between panel individuals”. If we reject the null hypothesis then we conclude that there is heterogeneity between panels. The Hsiao test shows that the model is a panel with individual effects, following the rejection of  $H_0^1$  ( $p$ -value of  $F1 = 1.260 \times 10^{-12} < 0.05$ ), acceptance of  $H_0^2$  ( $p$ -value of  $F2 = 0.188 > 0.05$ ), and acceptance of  $H_0^3$  ( $p$ -value of  $F3 = 1.266 \times 10^{-12} < 0.05$ ).

##### Hausman test

By conducting the Hausman test, the estimates showed that the value of the statistic is significant ( $\chi^2$  Statistic = 79.49 and Prob > chi2 = 0.0000). Accordingly, a fixed effects model is appropriate for estimation.

### Autocorrelation test

The null hypothesis of this test is the absence of first-order autocorrelation of the auto-regressive residuals of order 1 (AR(1)). The Wooldridge test is used. This test has the advantage of not needing to choose a priori between a fixed effects or a random effects model. The Wooldridge test shows the existence of autocorrelation ( $F(1, 23) = 15.330$  and  $\text{Prob} > F = 0.0007$ ).

### Heteroskedasticity Breusch–Pagan test

This test, which is related to the equality of variance for each governorate in each year, shows the presence of heteroskedasticity ( $\text{chibar2} (01) = 84.12$  and  $\text{Prob} > \text{chibar2} = 0.0000$ ). The rejection of the null hypothesis, according to which the individual effects and the explanatory variables are not correlated, confirms the significant difference between the governorates. This test is also used to complete the analysis of the Hausman test and is based on the Lagrange multiplier for random effects.

### 4.2. Estimation Results

Equation (1) of the model is estimated using the method of fixed effects (FE). Due to the presence of first-order autocorrelation of residuals and heteroskedasticity, other methods are also applied to estimate the equation. First, the AR(1) method is used to account for autocorrelation, and then the Generalized Least Squares (GLS) method is used to correct this autocorrelation and heteroscedasticity. Table 4 summarizes the obtained results.

**Table 4.** Estimation results.

| Variables | FE         | FE AR (1) | GLS       |
|-----------|------------|-----------|-----------|
| Ln EMLS   | 0.242 ***  | 0.226 *** | 0.379 *** |
| Ln LDM    | −0.125     | −0.038    | 0.335 *** |
| Ln CIVP   | −0.291 *** | −0.043    | −0.127    |
| AWT       | 0.104 ***  | −0.005    | 0.024 **  |
| Constant  | 4.329 ***  | 5.633 *** | 1.625 **  |

\*\*, and \*\*\* represent significance levels at 5, and 1%, respectively.

Estimation results show that active labor supply, EMLS, significantly affects job insertion in all three used methods. This is explained by the importance of this variable, which is related to job seekers graduating from universities and being capable of meeting the needs of companies. This result is confirmed by the significant positive impact of labor demand in the GLS method, which means that these companies find in university graduates the requested type of job candidates. The CIVP variable effect shows a limited negative impact on job insertion. The positive and significant effect, albeit weak, of the AWT variable by the FE and GLS methods shows that earlier applicants are favored for job insertion. This can be explained by the fact that companies would prefer to make the most of the wage subsidies granted by the government before the final recruitment of the intern; the CIVP consists of a one-year contract that can be renewed once.

### 4.3. Long-Term Effects

Next, a dynamic analysis is conducted with the aim of detecting the long-term effects of the independent variables related to job insertion.

For this purpose, two tests are necessary: (i) the test of stationarity, which aims to study the stability of the variables' characteristics and allows the assessment of possible analysis in the long term, and (ii) the Johansen cointegration test, which is conditioned by the previous test. The cointegration of the model is only tested when all variables are integrated of order 1.

### Stationarity tests

Based on the standard significance level of 5%, Table 5 shows that the variables are not stationary in level and become stationary after a single differentiation. Therefore, they are

integrated of order 1. This result implies that the model is susceptible to long-term analysis that aims to measure the effects of employment variables on job insertion.

**Table 5.** Stationarity test results.

| Variables | Test LLC     |                     |
|-----------|--------------|---------------------|
|           | At the Level | At First Difference |
| Ln JI     | 0.7709       | 0.0000              |
| Ln EMLS   | 0.4608       | 0.0000              |
| Ln LDM    | 0.1900       | 0.0000              |
| Ln CIVP   | 1.0000       | 0.0000              |
| AWT       | 1.0000       | 0.0000              |

### Cointegration test

The emphasis is now placed on the cointegration test, which would allow a choice between a Vector Auto-Regressive (VAR) model and a Vector Error Correction (VECM) model.

Following the stationarity test results, the model retained can be the subject of a long-term relationship study. This requires the analysis of cointegration. For this purpose, the Johansen test was retained since it was more robust than other tests. The results of this test appear in Table 6 and show the presence of cointegration.

**Table 6.** Johansen cointegration analysis.

| Alternative hypothesis: common AR coeffs. (within-dimension)      |           |        |                    |        |
|-------------------------------------------------------------------|-----------|--------|--------------------|--------|
|                                                                   | Statistic | Prob.  | Weighted Statistic | Prob.  |
| Panel v-Statistic                                                 | −2.458811 | 0.9930 | −3.372693          | 0.9996 |
| Panel rho-Statistic                                               | 3.707795  | 0.9999 | 3.781416           | 0.9999 |
| Panel PP-Statistic                                                | −3.283555 | 0.0005 | −6.381767          | 0.0000 |
| Panel ADF-Statistic                                               | −2.994498 | 0.0014 | −4.765828          | 0.0000 |
| Alternative hypothesis: individual AR coeffs. (between-dimension) |           |        |                    |        |
|                                                                   | Statistic | Prob.  |                    |        |
| Panel rho-Statistic                                               | 5.886639  | 1.0000 |                    |        |
| Panel PP-Statistic                                                | −10.83518 | 0.0000 |                    |        |
| Panel ADF-Statistic                                               | −6.317034 | 0.0000 |                    |        |

In view of the test results and after verifying the degree of integration and the existence of a cointegration vector, the VECM is estimated.

Since the interest is related to long-term effects, the estimation is made using the Fully estimator Modified Ordinary Least Squares (FMOLS). In this regard, [Kao and Chen \(1995\)](#) have shown that the estimation of cointegrated panels by the Ordinary Least Squares (OLS) is asymptotically biased. After examining the properties of the OLS estimator, [Chen et al. \(1999\)](#) found that, in general, the correction of the bias of the OLS estimator does not improve the quality of estimation. Their results suggest that the FMOLS model is more accurate.

Table 7 shows that the effects of all variables are positive and significant. The coefficients of labor demand (LDM) and insertion contract (CIVP) are the most important. These two variables explain job insertion at rates of 61% and 32%, respectively. Therefore, the CIVP program's beneficiaries are more likely to be inserted in companies for the long term.

**Table 7.** Estimation results in the long term.

| Variables | FMOLS    |
|-----------|----------|
| Ln EMLS   | 0.09 *** |
| Ln LDM    | 0.61 *** |
| Ln CIVP   | 0.32 *** |
| AWT       | 0.05 *** |

\*\*\* represent significance levels at 1%, respectively.

Next, we present the results of the VECM model estimation, which show both the long-term cointegration relationship and the short-term relationship between declared employment indicators.

The long-term results of the VECM confirm the significant effect of the CIVP variable. Table 8 also shows that more importance is given to labor supply compared to labor demand, as well as a negative effect of the waiting time variable. This means that, in the long term, seniority no longer plays a role in distinguishing between applicants with higher degrees.

**Table 8.** Estimation results of VECM in the long term.

| Variables    | VECM      |
|--------------|-----------|
| Ln EMLS (−1) | 0.26 **   |
| Ln LDM (−1)  | 0.012     |
| Ln CIVP (−1) | 0.47 ***  |
| AWT (−1)     | −0.36 *** |
| Constant     | 12.74     |

\*\*, and \*\*\* represent significance levels at 5, and 1%, respectively.

Table 9 shows that the error correction term CointEQ1 is significantly negative. This term refers to how the deviation of the last periods from a long-term equilibrium term influences its short-term dynamics. Thus, the VECM estimates at 32% the speed at which the job insertion returns to equilibrium after a change in the chosen variables.

**Table 9.** Estimation results of VECM in the short term.

| Error Correction | VECM      |
|------------------|-----------|
| CointEQ1         | −0.32 *** |
| D(Ln LI(−1))     | −0.11     |
| D(Ln EMJL (−1))  | −0.24     |
| D(Ln LDM (−1))   | −0.06     |
| D(Ln CIVP (−1))  | −0.21 **  |
| D(AWT (−1))      | 0.05      |
| Constant         | −0.02     |

\*\*, and \*\*\* represent significance levels at 5, and 1%, respectively.

The transition to a dynamic model gives short-term results that show a lack of significance for variables, despite the fact that the model is significant overall. The only significant effect is related to the negative effect of the CIVP variable, which can reflect the fact that companies are looking to benefit the most from this program throughout the duration of the internship before deciding on the job insertion of candidates.

Next, we examine governate effects by analyzing the results of the Auto-Regressive Distributed Lag (ARDL) model.

#### 4.4. Governorate Level Effects

The study of the short-term effects per governorate of the variables retained for job insertion is only possible using the ARDL model. The main results across the different governorates are summarized in Table 10.

**Table 10.** Results per governorate.

| Governorate   | Ln EMLS | Ln LDM | Ln CIVP | AWT    |
|---------------|---------|--------|---------|--------|
| Tunis         | < **    | < ***  | <       | < ***  |
| Ariana        | < ***   | > ***  | < ***   | > ***  |
| Ben Arous     | < ***   | < ***  | < ***   | > ***  |
| Manouba       | > ***   | < **   | < ***   | < ***  |
| Nabeul        | > ***   | > ***  | < ***   | < ***  |
| Bizerte       | > *     | < ***  | > **    | < ***  |
| Béja          | <       | < ***  | <       | > ***  |
| Jendouba      | < ***   | < ***  | < ***   | < ***  |
| Le Kef        | > ***   | < ***  | < **    | < ***  |
| Siliana       | < **    | > ***  | > **    | > ***  |
| Zaghouan      | > ***   | < **   | < **    | < ***  |
| <b>North</b>  | >< ***  | < ***  | < ***   | >< *** |
| Kairouan      | <       | > ***  | <       | > **   |
| Kasserine     | > ***   | < **   | < ***   | < ***  |
| Sousse        | < ***   | > ***  | < ***   | > ***  |
| Monastir      | < ***   | > **   | < ***   | > ***  |
| Mahdia        | < ***   | > *    | < *     | > ***  |
| Sidi Bouzid   | < ***   | > **   | < ***   | > ***  |
| <b>Center</b> | < ***   | > ***  | < ***   | > ***  |
| Sfax          | > ***   | > ***  | < ***   | < ***  |
| Gafsa         | > ***   | >      | < **    | < ***  |
| Tozeur        | > *     | > **   | <       | < ***  |
| Kebili        | > ***   | > ***  | < ***   | < ***  |
| Gabes         | < **    | < ***  | < *     | < ***  |
| Medenine      | < ***   | > ***  | < *     | > ***  |
| Tataouine     | < ***   | < ***  | < ***   | > ***  |
| <b>South</b>  | >< ***  | > ***  | < ***   | < ***  |

< and > represent respectively negative and positive effects. \*, \*\*, and \*\*\* represent significance levels at 10, 5, and 1%, respectively.

For labor supply, the effects are ambiguous for the northern and southern governorates and negative for central governorates. Labor demand negatively affects the governorates in the north, in contrast to central and southern governorates. Concerning the insertion contract, the effects are negative for all governorates. The waiting time variable favors job insertion for the central governorates unlike the southern governorates, while its effect on the northern governorates is ambiguous.

## 5. Conclusions

This paper analyzes the relationship between the job insertion of higher education graduates into the formal Tunisian labor market, with the effects of several independent

variables, namely labor supply, labor demand, the CIVP, a wage subsidy program, and the waiting time for labor insertion in 24 governorates during the period 2012–2020 being investigated.

The results in this paper revealed that, concerning the direct effects, the variable end of month labor supply (an indicator of active job seekers) appeared to be positive and significant, while the CIVP variable (labor market policy program) showed a limited negative impact on job insertion of graduates.

The dynamic analysis showed that, in the long term, most indicators positively and strongly affect labor insertion. The positive effects of labor supply and the CIVP reflect the relatively better qualifications of the job seekers to meet the needs of the companies and the importance of the CIVP program in recruiting young graduates, respectively. The negative effect of the average waiting time indicates that in the long term, seniority no longer represents an important factor for labor insertion.

In the short term, the dynamic analysis revealed, in general, negative but insignificant effects of the indicators on labor insertion, except for the CIVP variable, which showed a significant negative effect. The negative short-term impact of the CIVP program resulted from the fact that the effectiveness of this initiative is only achieved in the long term because companies prefer to make the most of the benefits granted by the government before recruiting the intern (one-year contract renewable only once). This might reflect the persistence of a risk of disruption, i.e., the continuous recruitment of new subsidized workers every time the previous subsidy runs out. Therefore, further conditions should be imposed on employers to ensure that a certain proportion of subsidized workers are accommodated before being allowed to receive any further subsidies.

In addition to the opposite effects of the CIVP program on labor insertion between the short-term and long-term dynamic analyses, the results showed that the problems related to the insertion of the active job seekers continue to persist over time and that there are inter-governorate differences across the areas. Hence, the government should take into consideration the special and unique characteristics of each governorate regarding unemployment issues and should consider a solution to the problems of unemployment that may include not only the specific groups but also the entire cohort of the unemployed population as part of the global employment strategy.

This study contributes to the available literature on employment subsidies in different ways. First, it shows evidence of the experience of a developing country. Second, while the available literature focuses more on schemes acting on either the supply or the demand in the labor market, this study integrates both sides. Third, this paper targets a specific group, namely higher education graduates. Finally, it highlights the heterogeneous effects of the wage subsidy program.

Also, the study presents practical contributions to policymakers. It shows that wage subsidies should not be regarded as permanent solutions to tackle graduate unemployment. Sustainable development is the key to resolving the unemployment problem, as well as the job insertion of higher education graduates in Tunisia ([Prince et al. 2024](#)). To achieve long-term sustainable development, the nation must support small and medium-sized enterprises in various industries in a way that makes such industries grow, expand, and continue to hire college graduates and other skilled human resources ([Asad et al. 2024](#)). An overhaul of education and vocational training institutions, appropriate monetary and fiscal policies, and continuous investment in manufacturing and service sectors will go a long way in promoting growth and insertion of higher education graduates in the labor market.

The current study has certain limitations as well since it covers only the time period from 2012 to 2020 and focuses only on Tunisia. In future studies, if more countries from the MENA region are included and more years of time series data are added, it is expected that the current model may uncover further insights into this complex issue.

**Author Contributions:** Conceptualization: A.K. and C.T.; Methodology: A.K., U.H., M.S.A. and N.S.; Software: C.T., Validation: U.H., M.S.A. and N.S.; Formal analysis: A.K., U.H., M.S.A. and N.S.; Investigation: A.K., U.H., M.S.A. and N.S.; Resources: A.K. and C.T.; Data curation: A.K. and C.T.; Original draft preparation: A.K. and C.T.; Writing—review and editing: U.H., M.S.A. and N.S.; Visualization: U.H., M.S.A. and N.S.; Supervision: U.H., M.S.A. and N.S.; Project administration: M.S.A.; Funding acquisition: U.H. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** Data will be made available upon request.

**Conflicts of Interest:** The authors declare no conflicts of interest.

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