

An Analysis of Factors Affecting Student Dropout: The Case of Tunisian Universities

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Samir Srairi^{1,2} 

Abstract

The purpose of this paper is to analyze the determinants of university dropout in the first year of bachelor programs at Tunisian universities. We consider 160 higher education institutions with an average of 671 bachelor study programs per year from 2013 to 2018. Using several econometric models (pooled ordinary least square, fixed effect model, and random effect model), we regress student dropout rate on four categories of indicators: student characteristics, and institutional, contextual, and external factors. The estimation results suggest that the institutional characteristics have a significant impact on dropouts. The findings show that student–staff ratio has a positive influence on student dropout. We also find a negative association between staff quality and dropout rate. In addition, the analysis reveals the importance of contextual factors such as university accommodation in helping students to complete university education. Finally, regression also indicates a significant and positive interaction between unemployment rate and the dropout rate.

Keywords

higher education, education performance, student dropout, fixed effect and random effect models, Tunisian universities

JEL Classification: C23, I21, I23

¹Planning and Programming, Ministry of Higher Education and Scientific Research, Tunisia

²University of Manouba, Tunisia

Corresponding Author:

Samir Srairi, University of Manouba, ESC de Tunis, RIM RAF, Manouba 2010, Tunisia.

Email: srairisamir3@gmail.com

Introduction

Higher education is considered to be a necessary condition to stimulate employment opportunities, social justice, and economic progress (Sneyers & De Witte, 2017). According to OECD (2011), individuals with a tertiary level of education have a greater chance of finding a job and earn more than those who do not have a university degree. However, several studies showed that in many countries a substantial number of students leave the university without obtaining a tertiary degree. Student dropout has become a serious issue in the higher education system of several universities due to its increasing frequency (Montmarquette et al., 2001). It can be seen as a drain on public finance and may affect the effectiveness and efficiency of the university system. Several studies (e.g., De Witte & Rogge, 2013; Rouse, 2005) find that dropping out from school has significant consequences in terms of income for both individuals and society. In addition, a high dropout rate shows that the higher education system probably failed to match students' expectations and needs (OECD, 2008). In the literature, there are two types of factors that can help predict whether students would drop out or graduate from high school: factors associated with the individual characteristics of students, and the factors associated with the institutional characteristics of their families, universities, and communities (Rumberger & Ah Lim, 2008).

In order to reduce dropout rates and increase the accountability of higher education institutions (HEIs), several actions have been undertaken, especially in the United States and Europe (e.g., No Child Left Behind Act, 2001; Lisbon, 2000; Europe, 2020 goals). For instance, many countries have introduced some form of performance-based funding. These mechanisms link funding to some performance indicators such as student dropout, graduation rates, and program quality ratings. Other approaches are focused on intensive coaching or mentoring programs (Gupta et al., 2020; van der Steeg et al., 2015). In this program, we use coaches that give intensive personal attention and support to students at risk. Students received support and guidance with their study activities, personal problems, and internships in firms.

In Tunisia, the higher education sector is organized as a binary system consisting of private and public institutions. In this paper, we focus on the latter group that comprises 13 public universities (178 institutions) and 25 institutions for higher vocational education. In the 2017–2018 academic year, the total number of students amounted to 241,084 (women accounted for 65.4%). According to the data published by the Ministry of Higher Education and Scientific Research (Table 1), the average dropout rate between 2013 and 2018 was situated at above 3%. The larger part of dropout cases occurs in the first year of bachelor programs (an average rate of 6%), probably indicating a misleading choice of academic discipline. The highest dropout rates were recorded especially in two disciplines: social sciences, business, and law (7.26%); and humanities and arts (8.1%). The dropout rate is higher for the male population in relation to female population (55% vs. 45%). The data related to the dropout rate for each institution show that bachelor programs with a high percentage of female students have a lower dropout rate.

Table I. Selected Statistics on Student Dropout in Tunisian Higher Education by Year, 2013–2018.

Years	2013	2014	2015	2016	2017	2018
Number of dropouts						
Total number of dropouts	16143	15586	10170	7812	11421	8765
Number of dropouts in bachelor program	10689	9168	6889	5324	8549	5267
Number of dropouts in the first year at bachelor program	7976	6899	5223	3978	7133	4011
Proportion of female	43%	48%	42%	42%	45%	47%
Dropout rates						
Average dropout rates	4.23%	3.83%	2.87%	2.48%	3.84%	2.76%
Average dropout rates in bachelor program	5.19%	4.12%	3.13%	2.60%	4.14%	2.85%
Average dropout rates in the first year at bachelor program	7.91%	6.89%	5.33%	4.64%	7.73%	4.99%
Dropout rates by fields of education						
Education	9.49%	7.45%	6.12%	1.38%	0%	0%
Humanities and arts	7.57%	9.10%	9.30%	6.86%	7.27%	8.51%
Social sciences, business, and law	8.34%	7.79%	4.56%	4.48%	13.59%	4.84%
Science	8.48%	5.04%	3.62%	3.80%	5.41%	3.99%
Engineering, manufacturing, and construction	8.76%	6.30%	3.91%	4.48%	3.43%	2.47%
Agriculture	6.03%	7.05%	9.57%	13.08%	4.46%	14.13%
Health and welfare	1.65%	2.49%	3.27%	2.88%	2.30%	2.82%
Services	7.86%	6.92%	6.11%	2.08%	2.77%	2.28%

Note. Website of the Ministry of Higher Education and Scientific Research (Tunisia).

To better understand the underlying causes behind why students drop out in Tunisia, this study aims at determining the main factors behind this phenomenon. More specifically, we investigate which factors influence student dropout in the first year of bachelor programs. To this end, we apply three econometric models (ordinary least square [OLS], fixed effects [FE], and random effects [RE]) and regress student dropout rate on a set of variables related to four categories of factors: student characteristics, institutional factors, contextual factors, and external factors.

Besides its research question, this paper is innovative in many ways. First, to the best of our knowledge, it is the first study analyzing the issue of dropout in Tunisian higher education system. Second, the paper gives an additional contribution to existing literature on university student dropout determinants: focusing attention on students enrolled in the first year of bachelor programs. Third, the econometric analysis is carried out on 160 faculties or institutes and includes an average of 671 bachelor study programs per year. Fourth, the analysis is based on extensive statistical data collected over a period of 6 years (2013–2018).

The paper is organized as follows. The literature on determinants of university dropout is overviewed in the next section. The third section provides information on variables, data, and the model used in this paper. Thereafter, the results of the analysis are presented, followed by the conclusion with policy recommendations.

Literature Review

Considering the importance of educational attainment to society, extensive research has been carried out in both developed and developing countries to examine determinants of university dropout. Student dropout is a highly complex concept influenced by various observed and unobserved factors (Sneyers & De Witte, 2015). In the literature, many factors have been identified as having a bearing on dropping out. Those factors can be grouped as (1) student factors, (2) family factors, (3) university factors, and (4) community and country factors.

The student factors include the psychological and behavioral factors, and demographic factors (De Witte et al., 2013). The first category of factors falls into three areas: educational performance, behaviors, and attitudes. Most scholars (e.g., Entwisle et al., 2004; Rumberger, 2004) have found that early academic achievement in elementary and secondary school is predictive of early university leaving. Other studies (e.g., Entwisle et al., 2005; Plank et al., 2005) suggest that grade retention significantly increases the likelihood of leaving university permanently. A wide range of behaviors both in and out of university has been shown to predict dropout and graduation. Research consistently finds that student engagement (students' active involvement in academic work and the social aspects of university life) predicted early withdrawal from university (Appleton et al., 2008; Entwisle et al., 2004; Hébert & Reis, 1999). Rump et al. (2017) find that intrinsic motivation was the strongest significant factor that predicts intention to drop out. Misbehavior in university and delinquent behavior outside of the university are both significantly associated with higher dropout and

lower graduation (Fergusson et al., 2003; Vizcain, 2005). Concerning student beliefs, values, and attitudes, a substantial body of research has generally focused on a single indicator: the educational expectations (how far in university a student expects to go). Several studies (Dustmann & van Soest, 2007; Entwisle et al., 2004; Rumberger, 1983) have found that a higher level of academic and professional aspirations or expectations are associated with dropout rates. The second type of factors is related to demographic characteristics. With respect to gender, some studies (Bynum & Thompson, 1983; Scott et al., 2006) found that women are less likely to drop out than men. Other scholars (Ishitani & Snider, 2006) suggest that race and ethnicity are linked to whether students dropout or graduate.

Besides students' characteristics, family factors can also influence educational outcomes. According to Rumberger and Ah Lim (2008), three aspects of family factors predict whether students drop out or graduate: family structure, family resources, and family practices. More unanimity in the literature is observed with regard to family structure. Students living with both parents have lower dropout rates compared to student living in other family arrangements (Rumberger & Ah Lim, 2008). Other studies (Dustmann & van Soest, 2007) suggest that students from large families find difficulty in continuing their studies. Regarding family resources, which are measured by the parents' occupational status, education, and income, several studies (Dalton et al., 2009; Orthner et al., 2002: 7; Swanson & Schneider, 1999) report that students from poor families (especially in case parents' income is below the poverty line) or whose parents did not graduate from university are at greater risk of dropping out from university than students from families without these risk factors. Family practices or parental support are also indicated as a predictor of university dropout. Students of parents who have high educational aspirations of their children and who monitor their children's university progress are more likely achieved their studies in universities (Bertrand, 1962; Cooper et al., 2005).

Factors related to the organizational and structural characteristics of university are also important to understand with regard to reasons for dropping out. Recently, Chen et al. (2020) find that the differences in dropout were largely attributable to institutional structural and resource differences. University factors may include university resources, the curriculum, university regulations, and teacher quality. Universities' resources are most frequently defined by the institutional size and teacher-student ratio. Smaller institutional size and lower student/staff ratio may have a positive effect on university achievement. Most studies (Calcagno et al., 2008; Scott et al., 2008) find a positive relationship between these two indicators and dropout rates. The effect of these variables on dropout is almost entirely related to a university's social climate, and more particularly the influence of student participation as well as the number of problems in the university environment (Davidson & Wilson, 2017; De Witte, Cabus, et al., 2013). Based on Tinto's (Tinto, 1975) model and Bean's model (Bean, 1980), empirical evidence suggests that students' social and academic integration in the institution (respectively institutional commitment and goal commitment) strongly influence student retention and student graduation. Students who are satisfied with the

formal and informal academic and social systems in a university interact more within both the academic and social spheres of their university and are less likely to drop out than those who do not. Closely related with the quality of an institution and academic integration are the institution's policy and regular practices. In their study on how a university's organizational structure affects dropout behaviors, Allens worth and Easton (2007) find that structures with clear norms in place held the most promise for students at risk of both absenteeism and dropout levels. Students are less likely to drop out if they attend institutions with a stronger academic climate and a high level of participation in university activities. Teachers' experience is also indicated in previous studies as a predictor of dropping out. De Paola (2009), among others, finds that teacher experience has a positive influence on course graduation rates. The higher the university's teaching quality performance, the lower the student's propensity to drop out (Johnes & McNabb, 2004).

The last factors that are linked to higher education students' dropout are community- and country-related factors. Several studies (e.g., Gao et al., 2019; Huisman & Smits, 2009; Rumberger, 2004) point out that community characteristics, such as local infrastructure, the urban or rural nature of the area, and geographical location of family residence may have detrimental effects on students' university performance, either directly or indirectly. These factors are related to political stability, economic conditions, government support, and programs regarding education, unemployment, and other fields (Jordan et al., 2012; Ravallion & Quentin, 1999; Rocha-Ruiz et al., 2018). Finally, as suggested by Smeyers (2006), these factors have a more significant influence on dropout in the case of dynamic interactions between them.

Data and Methodology

Determinants of Student Dropout

A large number of factors may have an impact on the length of time that it takes students to graduate or drop out from university. Student dropout is influenced by four categories of factors: student characteristics, institutional factors, contextual factors, and external factors (Table 2).

For the first group of variables, we choose two indicators: gender and student quality. The literature is inconclusive regarding the influence of gender on dropout. Johnes (1997) notes that men often carry on their education because of their attitudes to economic necessity and career advancement. Bailey et al. (2006) find that the percentage of female students negatively impacts graduation rates. However, several studies (Ou & Reynolds, 2006; Porter, 2000; Rumberger, 1983) suggest that institutions with more female students are expected to have lower dropout rates. The second indicator is related to student quality. A good performance at university is usually expected to provide a strong background for further academic studies. Several studies (e.g., Belloc et al., 2010; Paura & Arhipova, 2014) conclude that high dropout rates are related to university graduation marks. In Tunisia, students are oriented to faculties in two or

Table 2. Detailed Description of Variables Used in Regression Analysis.

Variables	Description
Dependent variable	
Student dropout rate	Percentage of first-year bachelor students that cease their education at the institution during an academic year.
Independent variables	
Student characteristics	
Gender	Share of women student in each bachelor program.
Student quality	Share of students oriented to HEI in the first session.
Institutional factors	
University size	Number of students in each bachelor program.
Education scale	Ratio of the number of students to the number of teaching personnel.
Staff quality	Total full professors and associate professors to total academic staff
Contextual factors	
Financial aid	Share of bachelor student in first year who received grants from state.
University accommodation	Share of student in each region of the country who benefit of university accommodation.
External factors	
Unemployment rate	Unemployment rate per region and per year

Note. HEIs = higher education institutions.

three sessions according to their results and scores in secondary education. We assume that students admitted to HEIs in the first orientation (university course selection) are more skilled than other students. Hence, we proxy the quality of students by the share of students oriented to HEIs in the first session. This indicator also shows the degree of student satisfaction. Students who do not feel satisfied with their institution of choice have a high risk of dropping out. Moreover, students prefer to enroll in institutions with high perceived student satisfaction.

Regarding the institutional factors, we examine three variables: the size of institution, education scale, and staff quality. Student dropout can be due to differences in institutional size. Some scholars (Pittman, 1993; Rumberger, 2004) have shown that smaller institutions are likely to result in lower rates of dropout. In general, large

institutions have greater program or curriculum diversity, but a less positive social climate and academic support. In line with many studies (e.g., Sneyers & De Witte, 2015), we proxy this variable by the number of students in each institution. The second variable concerns the education scale proxied by student–staff ratio. Smaller class sizes and lower teacher–student ratios lead to frequent interaction between student and staff and may have a positive effect on university achievement (Smeyers, 2006). Staff quality is also expected to influence the propensity to dropout (Blue & Cook, 2004; Dalton et al., 2009). In our paper, teacher experience is proxied by the proportion of full professors and associate professors to total academic staff. We assume that the ratio is negatively correlated with dropout rates.

Other determinants that are linked to higher education students' persistence are contextual factors. Several researchers (e.g., Carneiro & Heckman, 2002; Chen & Hossler, 2017; Stratton et al., 2008; Towns, 1997) conclude that students who obtained financial aid (grants or loans) tended to remain in university and achieve higher grades than the average student. Financial constraints might be strongly related to the decision to leave the university. In this study, this variable is proxied by the share of bachelor students in the first year who received grants from the State. Student dropout is also related to the issue of university accommodation and type of accommodation. A significant body of literature (e.g., Christie & Dinham, 1991; Torres & Solberg, 2001) suggest that staying in campus accommodation rather than living at home or at an off-campus location significantly facilitates integration to university life socially and academically. Findings from studies prove that dropout rates can be reduced through increased university accommodation. In Tunisia, students, especially males, can benefit from university accommodation for just 1 year. In consequence, they have to look for off-campus accommodation, which incurs further costs. In our case, this indicator is measured by the share of students in each region of the country who benefit from on-campus accommodation.

Finally, we examine the effect of external factors on the university environment. In our model, we introduce an economic indicator and we proxy it by the unemployment rate. Using a binomial Probit model, Smith and Naylor (2001) find that the dropout probability is positively affected by labor market conditions and particularly by unemployment in the country of prior residence. The same result is found by Akabayashi and Araki (2011) in the Japanese context.

Data

The data used in the study are provided by the Ministry of Higher Education and Scientific Research (Office for Studies, Planning and Programming) and covering the years 2013–2018 (six academic years). The study concerns 160 HEIs (12 public universities), and the final sample includes an average of 671 bachelor study programs per year. We concentrate our analysis on bachelor students enrolled in the first year of study. Our sample excludes students who are enrolled in medicine, pharmacy, architecture, and engineering schools since the dropout rate in these institutions is very low

and close to zero. We also eliminated private institutions in order to ensure comparability and obtain a homogenous sample. For the dropout analysis, we consider voluntary action and we calculate for each bachelor program in HEI and for each academic year the dropout rates. The student dropout rate is defined as the percentage of the first-year bachelor students who cease their education (students who do not pass exams) at the institution during an academic year. The panel dataset is unbalanced because some bachelor programs are eliminated or new curricula are created during the period of study.

The data are further enriched by information on staff in each institution (number and rank), university accommodation, and the number of grants delivered by the State for first-year bachelor students in each institution. Concerning the unemployment rates of each region in the country, the data are provided by the Tunisian Statistics Institute (INS).

Model

To examine the factors influencing student dropout rates in Tunisian universities, we apply the following linear model:

$$Y_{ij,t} = \alpha + \beta X_{ij,t} + \epsilon \quad (1)$$

Where $Y_{ij,t}$ is the yearly dropout rate of high school students in program of faculty or college j in year t . $X_{ij,t}$ represents a vector of exogenous variables, such as student characteristics, institutional factors, contextual factors, and external factors. It includes eight indicators : gender, student quality, size of institution, education scale, staff quality, financial aid, university accommodation, and unemployment rate. α is the constant of the model, β represents a set of parameters to estimate, and finally, ϵ is an error term.

Since we have a panel regression combining cross-section and time series data and following several studies (Clarke et al., 2010; Gitto et al., 2016), we estimate this equation by using the FE model (in this model, the error term is assumed to be constant over time) and RE model (the effects related both to individuals and time are random). These models (FE, RE) allow the solution of the problem of unobserved heterogeneity with the inclusion of error terms constant across time or varying randomly. The FE model is tested by the Fisher test (F), while the RE model is examined by the Lagrange Multiplier test (LM). If the null hypothesis of heteroscedasticity residual variance is rejected, the OLS regression is favored. In order to select the most appropriate model, the Hausman specification test (H) is performed.

Empirical Results

Descriptive Statistics

Before we analyze the determinants of university dropout, it is useful to comment on some preliminary features of our data. Table 3 presents descriptive statistics for

Table 3. Selected Descriptive Statistics of Variables Used in Regression Analysis.

Variable name	Mean	Minimum	Maximum	Std. Dev
Dropout rate	0.0579	0	0.652	0.086
Student characteristics				
Gender	0.6053	0	1	0.222
Student quality	0.3745	0	1	0.112
Institutional factors				
University size	153	8	1619	161.12
Education scale	16	7	55	7
Staff quality	0.324	0	1	0.283
Contextual factors				
Financial aid	0.348	0	0.949	0.14
University accommodation	0.1875	0.0654	0.588	0.0857
External factors				
Unemployment rate	0.158	0.09	0.516	0.057

Note. All variables are defined in Table 2.

dropout rates and the variables that concern student characteristics, and the institutional, contextual, and external factors. The summary statistics show, for example, that the average dropout rate is relatively high in the first year of bachelor program (5.8%) with an extremely high dropout (65.2%) in some programs. Concerning student characteristics, we observe that the share of female students is also high (60.53%) and on average only 37% of students are satisfied with their study program. On the other hand, Table 3 reveals that the share of students who received grants and benefit from on-campus accommodation is very low (35% and 19%, respectively). Further, the first-year bachelor program consists on average of 153 students enrolled with a student–staff ratio of 16:1 and a staff that consists of 32% of full and associate professors. Finally, the average unemployment rate in Tunisia during the period 2013–2018 is very high (15.8%) and reached a rate of 51.6% in some regions.

Regressions Results

To estimate the panel regression model (equation1), we used three alternative models: pooled OLS, FE, and RE. Three tests are applied to choose between these methods. First, the F test shows that individual effects are present, since the relevant F statistic is significant at the 1% level ($F(8, 1610) = 3.64$); thus, we choose the FE model. Second, for the RE model and in order to investigate whether there is evidence of heteroscedasticity in the residual variance, the Breusch–Pagan LM is calculated. With the large chi-squared (LM statistic = 772.53 with $p < .000$), we reject the null hypothesis in favor of the RE model. Finally as indicated by the Hausman test ($H = 47.75$

with $p = .000$), the difference in coefficients between FE and RE is systematic, providing evidence in favor of a FE model.

Table 4 presents the empirical results of the determinants of university dropout. The first column reports simple OLS estimates. In the next two columns, we report results using FE and RE models.

First, we consider the student characteristics that influence university dropout. As expected, we observe a significant negative relationship between student dropout and gender in the FE model. In Tunisia, dropout rates are generally higher for males than for females. This result is consistent with previous research (e.g., Rumberger, 1983; Scott et al., 2006; Zotti, 2015), which finds that gender is significantly related to student dropout. According to Sneyers and De Witte (2017), these gender differences in performance could be explained by differences in psychological and/or biological factors and in characteristics that are correlated with attainment (e.g., family background). Our results also indicate (OLS model) a significant negative correlation between student dropout and student quality. Students with a higher score in secondary education are less likely to drop out. In consequence, students who are not oriented to their preferred higher institution because of their lower score have a higher probability of dropping out of the university (Boero et al., 2005; Cingano & Cipollone, 2007).

Turning to the institutional factors, in line with the main literature, we find a positive and significant association between student dropout and student–staff ratio. Generally, a low student–teacher ratio correlates to high graduation rates (Bound et al., 2010; Rumberger, 2004). In higher institutions with a low student–staff ratio, there will be frequent and successful interaction between students and professors. This environment could play a crucial role to promote academic interaction and persistence (Tinto, 2002). The results of the analysis also show a favorable significant influence of staff quality on student dropout. This is in line with several studies. For example, Sneyers and De Witte (2017) find a significant positive influence of the percentage of staff older than 50 years on student graduation and program quality ratings (for given dropout rates). As indicated by Johnes and McNabb (2004), the higher the university’s teaching quality performance, the lower the student’s propensity to drop out. Concerning university size, our proxy is positive but not statistically significant. In the literature, the effect of university size on dropout is ambiguous. According to Pittman and Haughwout (1987), this issue is related to universities’ social climate, and more particularly to the influence of student participation as well as the number of problems in the university environment.

Regarding contextual factors, Table 4 shows for all models that financial aid does not have a consistent effect on dropout. This indicates that higher education scholarships and study grants have not proved to be sufficient to curb dropping out. In Tunisia, the grants received by students are very low in amount and do not encourage students to continue their studies. Our study also reveals (OLS and RE models) a negative and significant relationship between university accommodation and student dropout. The results supported by several studies (e.g., Christie & Dinham, 1991; Torres & Solberg, 2001) suggest that the students’ social conditions, especially the issue of

Table 4. Regression Results on the Determinants of University Student Dropout.

Independent variables	OLS		Fixed effect		Random effect	
	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
Student characteristics						
Gender	0.109	1.34	-0.065**	-3.04	-0.088	-0.81
Student quality	-0.045**	-2.91	-0.0842	-0.13	-0.021	-1.33
Institutional factors						
University size	0.037	0.41	0.372	0.426	0.091	0.8
Education scale	0.042	0.88	0.076**	2.17	0.194***	1.77
Staff quality	0.148**	2.31	-0.628**	-2.28	0.014	1.08
Contextual factors						
Financial aid	0.277	0.61	-0.486	-0.38	0.0127	0.92
University accommodation	-0.341*	-5.2	0.162	0.44	-0.490*	-3.32
External factors	0.493	0.86	0.227***	1.66		1.88
Unemployment rate	0.089	0.7	0.857*	3.92		0.94
Constant	2221		2221		0.516***	
No. of observation	0.0238				0.011	
Adjusted R ²					2221	
LM			47.75			
Hausman test					772.53	

Note. All variables are defined in Table 2. LM = Lagrange multiplier; OLS = ordinary least squares.
 *, ** and *** indicate statistical significance at 1%, 5%, and 10%.

accommodation, strongly influence persistence in the university and academic integration. Murray (2014), in the context of South Africa, finds that students with some form of residence-based accommodation are graduating on average more quickly than students who have no form of accommodation.

Finally, the variable related to external factors has a statistically significant effect on dropout. Our result is consistent with previous research. For instance, in Japanese high schools, Akabayashi and Araki (2011) find that between 1989 and 2005 (in the Tohoku area), the dropout rates for public and private schools are positively correlated with unemployment rates in this region. In addition, they suggest, in the case of private schools, that there is potential for a two-way causality effect of economic conditions on dropout rates.

Conclusion

Dropout is a multifactor phenomenon that has become an important social and economic problem in many countries. Considerable research has addressed factors associated with dropping out of university. The main purpose of this paper was to give an additional contribution to the extant literature on this issue, focusing the attention on the factors influencing dropout in the first year of the bachelor program at Tunisian universities. To address this complex concept, we examine the most important factors that have been studied in the literature, from student characteristics to institutional factors in universities and communities. An econometric model is used in this paper to understand the underlying causes behind students' decisions to drop out.

Many factors have been identified as influencing dropping out in Tunisian higher education. First, dropout rates are generally higher for males than for females. Second, our findings indicate that the institutional characteristics have an important impact on student dropout. The results of the regression show that education scale measured by student staff-ratio has a positive influence on dropout. We also find a negative association between staff quality and dropout rate. On the other hand, the analysis reveals the importance of contextual factors such as university accommodation in helping students to complete university. Finally, in addition to these factors, university dropout is influenced by external factors and especially by the economic conditions in the country. Empirical results suggest that unemployment rate is positively and significantly correlated to dropout.

Based on the findings of this paper, it is useful to draw some policy implications and recommendations. First, no single factor can completely account for a student's decision to continue in university until graduation. For this reason, any policy decision of relevance must necessarily focus on the whole aggregate of factors at the level of students, universities, and the broader environment (De Witte et al., 2013). To improve social and academic integration and provide a more attractive learning environment, policymakers have to implement some measures and programs in the university to counteract student dropout (e.g., new teaching approaches, development of extracurricular activities, increase the degree of student participation, development of literacy

and language). In some countries (United States, Germany, the Netherlands), universities have adopted the community school concept where the students and social environment are closely involved. This concept is a combination of three activities: cooperation with external organizations, student and family involvement, and extra-curricular activities. Third, universities have to identify as soon as possible the students who are most likely to drop out and to provide special care and programs for them (e.g., intensive coaching or mentoring programs, orientation courses, peer-tutoring programs). For these reasons, it is suggested in several studies (e.g., Gupta et al., 2020) that universities should maintain detailed record about student dropout. Research has shown that these prevention programs have significantly improved pass rates, exam grades, and levels of retention (Glass & Garrett, 1995; Nelson, 1993). Fourth, Tunisian universities have to reinforce their staff with experienced professors, which may lead to better student performance. In this regard, to increase the number of professors and associate professors in universities, the university has to encourage researchers by implementing a competitive system for the allocation of research funding. Finally, it is necessary to develop a prediction model that can be used by educators, schools, and policy makers to predict the risk of a student to drop out of school. Machine learning approaches are one of the well-sought solutions to address the school dropout challenge (Aulck et al., 2017; Mduma et al., 2019).

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ORCID ID

Samir Srairi  <https://orcid.org/0000-0002-4244-3921>

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Author Biography

Samir Srairi, PhD, is full professor at the Higher business School of Tunis, university of Manouba, where he is teaching several courses in Finance and Accounting. He worked in a wide variety of institutions in Tunisia and in Saudi Arabia. He has published many articles in academic journals written in different languages (English, French and Arabic) related essentially to banking, corporate finance and education. He was also responsible and member of many academic committees at the university in Tunisia and in Saudi Arabia. He worked for six years as advisor in charge of the office of studies, planning and programming, Ministry of higher education and scientific research in Tunisia.