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ABSTRACT: An effective institutional structure is a crucial tool for having a highly functioning education system and consequently, economic growth and development. We analyse the effects of decentralisation and school autonomy on the quality of education in two MENA countries (Jordan and Tunisia), by using the OECD PISA 2009 database. Results reveal that decentralisation has a positive impact on the quality of education in some decision-making areas, whereas most autonomy related variables are not significant. Accordingly, schools with more autonomy management and facing more competition do not lead to different results than others, while (public) ownership is positively significant only in Tunisia. However, private funding and accountability measures are positively associated with student achievement.

JEL Codes: H40, H52, I28

Keywords: Education, decentralisation, school autonomy, Tunisia, Jordan, MENA, PISA

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1. Introduction

In order for a country to grow, it has to ensure that all its citizens acquire the skills and quality of education needed to be able to compete in a modern, integrated and globalized world. Based on economic theory, having a competent education system will lead to the rise of long-run economic growth rates, since human capital investment increases labour productivity and is considered a vital input for innovation and technical progress (Lucas 1988; Romer 1990; Barro 1997; Barro and Sala-i-Martin 2004). In the context of the African Economies, nowadays higher education is essential for economic development (Kimenyi, 2011). Likewise, school quality and not just quantity, is crucial in shaping a country's economic growth (Hanushek and Kimko 2000; Hanushek and Woessman, 2008). Thus, improvement in the efficiency of education is a key variable for a country's development.

It is commonly known that having a highly functioning education system is only possible in presence of a supportive institutional structure; decentralisation is a fundamental aspect of current institutional innovation throughout the world, where local autonomy has been an issue of intense debate in both developed and developing countries. Several international agencies like the World Bank, the OECD and the United Nations have been recommending decentralisation, especially in education, as an approach for development and growth, since the 1960s. Within this framework, Nechyba (2003) argues that school autonomy is expected to result in greater public school efficiency.

Plentiful empirical literature has put efforts in order to estimate the impact of government spending decentralisation on educational outcomes, where most evidence gives support to decentralised education systems as it heightens student achievement (Falch and Fischer 2012). However, research has not given emphasis on solely decentralisation; choice as well as accountability measures are also vastly significant institutional features affecting the quality of education (Nechyba 2000; Bishop and Woessmann 2004). Accountability systems deliver better information on student performance, and thus directly or indirectly reward students, teachers and principals for their actions. Moreover, school choice due to competition brings about a boost in school performance (Sandstrom and Bergstrom 2005; Woessmann and others 2009).

Our study examines the effects of decentralisation and school autonomy (this considers school management, ownership and funding, competition and accountability measures) on the quality of education in Jordan and Tunisia, after controlling for school factors, student and family characteristics. The data utilized in our analysis is the OECD's Program for International Student Assessment (PISA) 2009 database since it encompasses an adequate proxy for the quality of education, which is the students' test scores in mathematics and reading. The main contribution of this paper is being the first to examine decentralisation effects on the quality of education in the Middle East and North Africa (MENA) region, as well as being an addition to the scarce research on school autonomy in developing countries. Furthermore, we examine our variables of interest using the most updated data (PISA 2009) in comparison to other similar studies. The choice of Jordan and Tunisia as the focus of our study is entitled to the fact that they rank 1st and 2nd respectively in the MENA region according to the Human Development Index in 2007. Hence, both countries could be used as a benchmark for the rest of the region to follow.

Our findings show that decentralisation (defined as regional or local education authorities having total or partial responsibility for educational policies) has a moderate impact on the quality of education in some decision-making areas. Complete or partial decentralisation in school budget formulation and establishing student assessment policies is positively associated with student achievement in Tunisia, while complete or partial decentralisation in personnel decisions has a positive effect on student achievement in Jordan. Regarding school autonomy variables, we find that autonomy management has no significant effect on student attainment in both countries, except for a minor negative impact in Jordan. Results reveal that publically operated schools perform significantly better in Tunisia; however the type of school operation has no effect on achievement in Jordan. Private funding in all types of schools leads to a rise in students' test scores in both countries, while competition has no significant impact on student achievement, with the exception of a slight positive effect on mathematics in Jordan. Concerning the accountability variables examined, our outcomes show that comparing students' assessments to district/national performance or other schools, as well as parental pressure on schools both play an important positive role in Tunisia and

Jordan. While, schools that post achievement data publicly do not lead to distinctive student test scores, except for a slight negative impact on reading literacy in Jordan.

We would like to highlight the following. First, this paper analyses a group of variables not considered in the analysis of educational systems in MENA countries (especially those referring to decentralization). Second, it employs the most updated data available enclosing information about educational autonomy and decentralization for the countries considered. Finally, the methodology used allows us to provide robust results. We expect the results to help policy makers and government officials build more efficient education systems regarding students' achievement.

The structure of the paper is as follows. The next section discusses the previous literature regarding the institutional features, which are our variables of interest. Section II provides a description of the data used in our study as well as the empirical strategy utilized. Then, results are shown in section III and a final section summarizes our conclusions.

2. Decentralization, autonomy and students' achievement

This section includes the institutional features that have received the utmost interest in the previous literature around the world: Decentralisation (2.1), in addition to several issues related to school autonomy such as autonomy management (2.2), ownership and funding (2.3), competition (2.3) and accountability measures (2.4).

2.1. Decentralisation

Bottani (2000) states that several countries have applied educational reforms since 1980, which principally decentralised authority from central to local level. Maslowski and others (2007) claim that educational decentralisation is often employed in hope to enhance the quality of education. Several studies like Barankay and Lockwood (2007) as well as Falch and Fischer (2012) show that decentralisation has a positive effect on education attainment. Furthermore, Faguet (2004) discovers that local governments in Bolivia retain superior knowledge of idiosyncratic educational preferences, and thus

produce better outcomes. Additionally, Galiani and Schargrodsky (2002) report positive results for public education decentralisation in Argentina in the early 1990s.

Most of the papers examining the impact of educational decentralisation on student outcomes (Chubb and Moe 1990; Bishop and Woessmann 2004; Fuchs and Woessmann 2007) have focused on school autonomy as a measure of decentralisation, without isolating both effects and giving particular attention to the degree of governmental involvement. One of the main contributions of our study is the isolation of both impacts on the quality of education, which is an addition to the scarce number of researchers doing so.

2.2. Autonomy management

Based on economic models of school governance, Hoxby (1999) together with Nechyba (2003) argue that an increase in autonomy is likely to result in a rise in the efficiency of public schools. Woessmann (2001), as well as Fuchs and Woessmann (2007) show that students perform significantly better in schools that have autonomy in process and personnel decisions such as budget allocations, hiring and firing teachers, in addition to the choice of textbooks and methods of instruction. Additionally, Naper (2010) and Robin and Sprietsma (2003) show that autonomy in hiring of teachers heightens school effectiveness. Autonomy in staffing decisions also proves to positively affect students' test scores in mathematics based on the PISA 2003 database (Woessmann and others 2009). Likewise, Clark (2005) as well as Eskeland and Filmer (2007) report a positive relation of school autonomy in management on educational outcomes in the United Kingdom and Argentina respectively. Similarly, Eurydice (2007) provides evidence of a positive effect of school autonomy on learning in Europe. On the other hand, autonomy in some areas can lead to negative consequences. Hanushek and Woessmann (2011) as well as Woessmann and others (2009) argue that school autonomy regarding budget formulation and teacher autonomy regarding subject topics to be covered in class have a negative impact on student test scores. In addition, Woessmann (2001) shows that school autonomy in budget formulation has a negative effect on student test scores in both mathematics and science.

Moreover, Hanushek and others (2013) use cross-country panel analysis for 42 countries over ten years to show that autonomy has a significant impact on school performance; however this impact differs depending on the country's level of development. They find that in developed countries, the impact of school autonomy in decision-making is positive, while it is oppositely negative in developing countries especially in areas related to academic content. Using a sample of eight Latin American countries, Gunnarsson and others (2009) show that school autonomy has no significant effect on school performance. Moreover, Bardhan (2002) adds that autonomous decision-making is likely to fail in developing countries due to inadequacy in experience and skills of the local officials. Using a quintile regression model, the sole paper that examines the effects of school autonomy on skills proxied by student achievement in the MENA region, shows that it has a negative effect on mathematics test scores in Jordan and Tunisia, where school autonomy is defined as pedagogical autonomy over textbooks, course content and the offered courses (Shafiq 2011).

To sum up, the reviewed literature shows support for the positive impact of autonomy management and distribution of responsibilities between schools and administration on the quality of education. However, school autonomy does not lead to beneficial consequences in all cases. Furthermore, the effectiveness of school autonomy also depends on the country's level of development, where autonomy is more likely to be successful in developed countries, than in developing ones.

2.3. Ownership, Funding and Competition

A major institutional aspect that has been the core of evaluation of various researches is the performance of publicly operated schools versus the performance of privately operated schools, in addition to the effect of competition due to the presence of private schools (Hoxby 2003; Rouse and Barrow 2009).

Scheifer (1998) as well as Bishop and Woessmann (2004) state that economic theory is ambiguous when it comes to the impact of public versus private management in education, where some researchers claim the existence of a positive impact of private operation of schools on student performance, others indicate that the type of school has no effect on student outcomes when controlling for the socioeconomic environment and

a third group states a negative effect of privately operated schools. Studies which are in favour of private schools operation include: those examining the United States like Hanushek (1986), Neal (1997) and Opdenakker and Van Damme (2006) and those examining developing countries like Cox and Jimenez (1991)). In addition to papers using data from PISA-2000 like Corten and Dronkers (2006) and Fuchs and Woessmann (2007), which provide empirical support indicating an association between privately operated schools and higher student test scores. On the contrary, other studies state that subsequent to controlling for the student's socioeconomic background, the type of school operation has no effect on achievement. Those studies include Dronkers (2004) as well as Altonji and others (2005) studying the United States. In addition to Fertig (2003) who use German PISA data showing no effect regarding the type of school. Furthermore, there is a third group of studies claiming a negative effect of privately operated schools on student outcomes like Kirjavainen and Loikkanen (1998) on Finland and Newhouse and Beegle (2006) on Indonesia.

The use of market mechanism is considered to be a form of decentralisation where the promotion of more competition induces individual schools to increase student achievement due to parental demand. Woessmann and others (2009) find that when students possess a variety of schools to choose from, improved student achievement is observed. Similarly, West and Woessmann (2010) state that school systems that encompass a number of privately operated schools create alternatives for students, which as a result increase public schools performance due to private-sector competition. Furthermore, Bjorklund and others (2004) as well as Sandstrom and Bergstrom (2005) find evidence of improved performance of public schools in Sweden as a consequence of competition from privately operated schools, while Bradley and Taylor (2002) and Levacic (2004) report the same positive impact for English schools. Observing the magnet schools program in the US where the zone barriers for schools are eliminated and thus school choice is increased, Gamoran (1996) as well as Bifulco and others (2008) showed that students who attended those schools scored higher on achievement exams. Moreover, Frankenberig and Seigel-Hawley (2008) discovered positive influence of magnet schools on decreasing dropout rates. On the contrary, analysing an educational UK reform, Clark (2005) finds only a slight positive impact of market competition, as spillover effects were very small.

2.4. Accountability

Numerous countries have experienced a boost in accountability of local schools for student performance such as the United Kingdom's "league tables" systems and the United States' "No Child Left Behind" federal law (Hanushek and Woessmann 2011). The concept of accountability dates back to the second half of the twentieth century where Stiglitz (2002) as well as others showed that markets fail in absence of information. This concept is the same for the education market where better student knowledge is enhanced by adequate information on performance. Carnoy and Loeb (2003) as well as Dee and Jacob (2011) provide evidence in support of a positive effect of strong state accountability systems on student attainment. According to Woessmann and others (2009), accountability procedures related to teachers, as well as schools such as posting achievement data publicly or using assessments as a comparison to district or national achievement have a positive impact on the quality of education provided. Schools and countries that apply diverse forms of accountability policies (aimed at students, teachers and schools) possess better student performance (Woessmann and others 2009).

Several countries such as England and France publish national league tables of schools on the basis of student performance on central exams, thus inducing schools to perform better. Moreover, parental involvement is also considered a method of accountability where principal-agent theory on teacher and parents argue that it reinforces schools to be self-serving and utilize funds according to parental demand and thus become more efficient (Prichett and Filmer 1999; Shafiq 2011).

3. Data and Methodology

In this section, PISA data well as the variables studied are explained and the econometric strategy used in the empirical analysis is illustrated.

3.1. PISA Data

The data used in this study is extracted from the "Programme for International Student

Assessment" (PISA) 2009 database. The Organization for Economic Co-Operation and Development (OECD) initiated PISA, which is an international program occurring every three years, since the year 2000, with a goal of assessing the achievement of students who are 15 years old at the time of the test, in three domains: reading, mathematics and science. The PISA 2009 database was the fourth edition, which included approximately 470,000 students from 65 countries. The Tunisian sample includes 4,955 students from 165 different schools, while the Jordanian sample includes 6,489 students from 210 schools (OECD 2009).

In order to empirically estimate the impacts of the decentralisation and school autonomy variables in both countries, institutional characteristics are primarily employed. However, student performance is dependent on several other factors within and without the school system; hence those characteristics must be taken into account in order to isolate the institutional impacts. Therefore, our control variables involve students' personal characteristics, household variables, as well as school factors. The institutional factors, which are our main variables of study, are the divided into decentralisation and some variables related to autonomy, such as school management, ownership and funding, competition, and accountability (all descriptive values are shown in table 1).

*Decentralisation***.** It is analysed through whether the regional or local education authorities have complete or shared sizeable responsibility versus the national education authority for the following tasks: hiring and firing teachers, determining teachers' salaries increases, formulating the school budget, deciding on budget allocations within the school, establishing student assessment policies and determining course content. Decentralisation is still considered a new concept for the MENA region, thus it is more probable to witness partial decentralisation than complete decentralisation, since national education authorities still have at least shared responsibility in decision-making.

Autonomy management. It involves whether the principals, teachers or school governing board have considerable responsibility for the following tasks: hiring and firing teachers, determining teachers' salaries increases, formulating the school budget, deciding on budget allocations within the school, establishing student assessment policies, approving students' admission to school, choosing which textbooks are used

and determining course content.

*Ownership and Funding***.** It includes the type of the school (public or private) and the school's source of funding (whether private funding is higher than 20 per cent of total resources).

*Competition***.** It is measured by examining whether the school has one or more schools competing for students.

*Accountability***.** It is analysed through observing whether the assessments of students are used as a comparison to district/national performance or as a comparison to other schools, in addition to whether achievement data are posted publicly (for example in the media). Furthermore, parental pressure on schools is also included; where it is divided into two variables whether the parental pressure is a majority or a minority.

(Insert table 1 around here)

Students' personal characteristics include student age, gender, the grade level, as well as whether he lives with both his parents or not (family structure). Household variables compromise socio-economic and cultural characteristics, as well as educational resources. Regarding the socio-economic and cultural characteristics, the variables considered are the student's mother's and father's years of schooling, whether the parents are active in the labour market or not, as well as the father's occupation which is classified as follows: qualified white collar, non-qualified white collar, qualified blue collar and non-qualified blue collar. Also, a dummy variable is included taking a value of '1' if there are more than 25 books at home and a value of '0' otherwise. The educational resources consider whether the student uses a computer at home in addition to a PISA index (Home Educational Resources), which refers to whether the student has access to school resources at home such as a desk and a dictionary.

School variables include school characteristics, school parental status, school policies, as well as staff-related aspects. School characteristics refer to the school location (village, town or city), the school size (total school enrolment), the class size (number of students in class), the students' composition at school (percentage of girls), as well as

the percentage of repeating students and the number of computers connected to the Internet. In addition to the learning time (minutes per week) devoted to reading and mathematics, and whether the learning of students is hindered by student absenteeism. School parental status includes the occupation, which takes the mode value of the parents' occupations at each school, as well as the school educational climate, which take the value of the average years of parents' schooling. School policies compromise several issues like the streaming of students by ability, and whether the student admission is based on: residence, academic performance, recommendation of feeder school, parents' endorsement of the instructional or religious philosophy of the school, students' interest in a special program and preference to family members of current or former students. Moreover, a dummy variable taking the value of '1' if a student would be transferred to another school because of behavioural problems, and a value of '0' otherwise, is included. Finally, staff-related aspects include whether the principal is a woman or not, the proportion of qualified teachers, the student-teacher ratio, and whether the student learning is hindered by: lack of mathematics or reading teachers, teacher shortage or a bad student-teacher relationship.

3.2. Empirical Strategy

PISA data is obtained through a two-stage stratified sampling technique. This two-step stratified sample procedure leads to nesting students at the first level with schools on the second level. Therefore, within the same class or same school, the individual measurements are not independent. This is considered a violation of independence; thus traditional regression models at student level cannot be used. Hierarchical Linear Model (HLM) has a nested structure, which permits regression coefficients to vary from one context to another (Bryk and Raudenbush 1992). Accordingly, Hierarchical Linear Modelling (HLM) is regarded as an ideal procedure for our analysis.

Equations (1) to (4) below represent the econometric model used, where Y_{ij} is the achievement in each competence of a student 'i' in school 'j', X_{kij} is a vector of 'k' characteristics of student 'i' at school 'j' (or independent variables at level 1), and Z_{lj} is a vector of 'l' characteristics of school 'j' (or independent variables at level 2). Random effects are μ_j (at school level) and ε_{ij}, (at student level). β are the estimated parameters. Equation (4) is obtained by introducing equations (2) and (3) into equation (1). Thus, in

equation (4) a set of fixed effects ($\gamma_{00}, \gamma_{10} X_{kij}, \gamma_{0l} Z_{lj}$) can be distinguished from a group of random effects ($\mu_{0j}, \varepsilon_{ij}$). We choose not to introduce random effects in equation (3), as we are interested in estimating mean effects for the whole sample.

$$Y_{ij} = \beta_{0j} + \sum_{k=1}^{n} \beta_{1j} X_{kij} + \varepsilon_{ij} \qquad \varepsilon_{ij} \sim N(0,\sigma^2) \qquad (1)$$

$$\beta_{0j} = \gamma_{00} + \sum_{l} \gamma_{0l} Z_{lj} + \mu_{0j} \qquad \mu_{0j} \sim N(0,\tau_0) \qquad (2)$$

$$\beta_{1j} = \gamma_{10} \qquad \mu_{1j} \sim N(0,\tau_1) \qquad (3)$$

$$Y_{ij} = \gamma_{00} + \gamma_{10} X_{kij} + \gamma_{0l} Z_{lj} + \mu_{0j} + \varepsilon_{ij} \qquad (4)$$

Similarly like all surveys and questionnaires of this kind, the PISA 2009 database includes some missing data. However, this problem is minor for most variables in the Tunisian and Jordanian dataset where the missing values' percentage is below five per cent. Only a few variables exhibit a missing rate slightly above 10 per cent. In order to handle this missing data problem, we use data imputation following the regression imputation method suggested by the OECD (2012), where missing values are replaced by the predicted values obtained from regression. The dependent variable of our regression is the individual indicator holding the missing value, whereas the explanatory variables are the individual indicators exhibiting a strong relation with the dependent variable (a high degree of correlation). The regression imputation method holds a superior advantage over replacing missing values with the average value since it produces a unique value for each case depending on the other related explanatory variables. Finally, our estimations provided robust standard errors and multicollinearity was not observed (all VIF values being below 4).

4. Results

This section discusses our estimation results of the impact of decentralisation and school autonomy variables on the quality of education. It has to be noted that when analysing decentralisation, only public schools are considered since only these schools are relevant.

Our results are shown through four tables: Tables 2 and 3 present the results of the HLM regressions on the mathematics and reading achievement scores, for the whole sample (School Autonomy Variables) and the subsample (Decentralisation Variables) respectively in Tunisia. While tables 4 and 5 present the same type of results for Jordan.

4.1. Tunisia

First, focus is directed to table 2, which reveals our findings regarding the school autonomy variables considering the whole sample (public and private schools). Looking at the autonomy management variables, we discovered that none of those variables have a significant effect on student performance in either mathematics or reading literacy tests. This means that school autonomy on personnel decisions, financial resources or curriculum does not cause any difference in student achievement. This finding is in line with previous literature on developing countries where no impact of autonomy management is expected (Gunnarsson and others 2009).

On the contrary, the ownership and funding variables proved to notably have a significant effect on the quality of education; however their impacts go in reverse ways. Opposing to previous literature indicating that private school operation leads to higher quality than public school operation (Shleifer 1998; Bishop and Woessmann 2004), yet aligned with other studies like Kirjavainen and Loikkanen (1998) and Newhouse and Beegle (2006), our results show that publicly operated schools have a highly significant positive impact on student test scores in both mathematics and reading. On the other hand, a higher percentage of private funding in any type of school leads to a boost in student achievement in both tested domains. Having a share of private funding equivalent to a value higher than 20 per cent increases student test scores in both mathematics and reading. Prior economic literature shows support for the positive impact of having a competitive education market (Levacic 2004; West and Woessmann 2010), yet our results show that the results do not differ significantly between a school that has one or more schools competing for its students and another that does not.

Regarding accountability measures, our findings are aligned with previous studies like Prichet and Filmer (1999) and Shafiq (2011), showing the importance of parental influence in Tunisia, where student test scores are higher in mathematics and reading

when most parents pressure the school to achieve higher academic standards. However, schools that use students' assessments as a comparison to district/national performance or to other schools, do not lead to a difference in student performance in mathematics, but only has a positive effect on reading literacy. Posting achievement data publicly has no significant effect on student achievement in either mathematics or reading.

(Insert table 2 around here)

Looking at table 3, regression results regarding the impact of decentralisation on the quality of education are shown, where the subsample containing only public schools is considered. Our findings show that most of the decentralisation variables do not have a highly significant effect on student test scores in either domain, especially the reading literacy domain. Students who are enrolled in schools that exhibit complete or partial decentralisation in personnel decisions like hiring and firing teachers do not achieve significantly distinctive results than other students who are enrolled in centralised schools. Concerning complete or partial decentralisation in formulating the school budget and in establishing student assessment policies, students who attend schools where the regional or local education authorities have complete or shared sizeable responsibility in those tasks score higher in mathematics; however it does not affect reading literacy test scores. It has to be noted that the results regarding the control variables, as well as the school autonomy variables do not experience considerable significant changes after introducing our decentralisation variables (results available upon request).

(Insert table 3 around here)

4.2. Jordan

First, we reflect our findings on school autonomy variables, which are shown in table 4 considering the whole sample. Observing autonomy management variables, our findings reveal that most of those variables have no significant effect on student performance in either mathematics or reading literacy tests. School autonomy in hiring and firing teachers seems to have a significant negative impact on student performance in mathematics only, as well as school autonomy in approving students for admission to

the school which shows a negative association with reading test scores. This finding contradicts previous literature where a positive relationship was indicated between student performance and autonomy in personnel decisions such as hiring and firing teachers (Woessmann 2001; Fuchs and Woessmann 2007).

The ownership and funding variables prove to have a low or no significant effect on the quality of education. Being a publicly operated or a privately operated school has no effect on student attainment in any of the domains examined in our study. However, having a higher percentage of private funding leads to an improvement in student achievement in reading literacy only.

Researchers like Bradley and Taylor (2002) and Sandstrom and Bergstrom (2005) give support for the positive association between competition and student performance, nonetheless our results are aligned with their finding only when it comes to mathematics test scores. A school that has one or more schools competing for its students leads to a rise of points in mathematics, but does not lead to different outcomes in reading compared to another school that experiences no competition.

The three variables used as a measure of accountability seem to play an important role on the quality of education in Jordan where parental influence has a significant positive influence on student performance when most parents pressure the school to achieve higher academic standards. Additionally, schools that use students' assessments as a comparison to district/national performance or to other schools, cause a rise in student attainment in both mathematics and reading literacy. Posting achievement data publicly has no significant effect on student achievement in mathematics; nevertheless it reduces reading test scores.

(Insert table 4 around here)

Observing table 5, regression results regarding the impact of decentralisation on the quality of education in Jordan are shown, where the subsample containing only public schools is considered. Our findings show that decentralisation does not have a highly significant impact on the quality of education in most areas. Students who attend schools that reveal complete or partial decentralisation in either establishing student

assessment policies or determining course content do not achieve significantly distinctive results than other students who are enrolled in centralised schools. However, students who are enrolled in schools that exhibit complete or partial decentralisation in the area of hiring and firing teachers and determining teachers' salaries achieve higher results in achievement exams, in comparison to other students who are enrolled in centralised schools. Results regarding the control variables, as well as the school autonomy variables do not experience considerable significant changes after introducing our decentralisation variables (available upon request).

(Insert table 5 around here)

5. Conclusions

It is universally acknowledged that an effective institutional structure is a crucial tool for having a highly functioning education system. Decentralisation of public services, especially educational services has been a common recommendation by several international agencies like the World Bank, the OECD and the United Nations since the 1960s, as it is considered a means for growth and development, and has been implemented by various countries around the globe. Previous research has been considerably ambiguous regarding the impact of decentralisation and school autonomy on the quality of education. Empirical studies regarding this topic are limited, especially for developing countries.

Our study is an addition to the scarce literature, where we tackle this issue by examining the effects of decentralisation and school autonomy (this considers school management, ownership and funding, competition and accountability measures) on the quality of education in Jordan and Tunisia, after controlling for school factors, student and family characteristics by using the OECD PISA 2009 database.

Our findings are somewhat aligned with the understanding that decentralisation reforms improve student achievement, yet this is revealed in limited areas of decision-making. Complete or partial decentralisation in school budget formulation and establishing student assessment policies is positively associated with student achievement in

mathematics in Tunisia, while decentralisation in personnel decisions has a positive effect on student achievement in both mathematics and reading literacy in Jordan as well as the task of hiring and firing teachers on mathematics test scores.

Regarding school autonomy variables, we find that autonomy management has no significant effect on student attainment in both countries, except for a minor negative impact in Jordan. Results on ownership reveal that publically operated schools perform significantly better in Tunisia in both mathematics and reading literacy. However the type of school operation has no effect on achievement in Jordan. In addition, private funding in all types of schools leads to a rise in students' test scores in both countries. In relation to competition, the presence of one or more schools competing in the same area has no significant impact on student achievement, with the exception of a slight positive effect on mathematics in Jordan. Concerning the accountability variables examined, our findings show that comparing students' assessments to district/national performance or other schools, as well as parental pressure on schools both play an important positive role in Tunisia and Jordan. However, schools that post achievement data publicly do not lead to distinctive student test scores, except for a slight negative impact where scores marginally decrease in reading literacy in Jordan.

To sum up, our results show some positive effects of decentralisation on student achievement. Regarding school autonomy; it appeared that when autonomy is related to the management of the centres, it has no significant impact on students' attainment. The same was observed for school competition. However, ownership (public schools) as well as percentage of private funding exposed a positive association with the quality of education. The existence of accounting systems whether related to families or schools also revealed a positive relation. Accordingly, these results are expected to be valuable and of use for policy makers and government officials when designing educational systems in aim to improve students' achievement and higher education standards, especially in the MENA region.

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Table 1: Main descriptives: Institutional settings (Tunisia and Jordan)

	Tunisia		Jordan	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**
Decentralisation				
Hiring and firing teachers:				
- Completely or Partially decentralized	0.206	0.404	0.160	0.366
- Centralised	0.794	0.404	0.840	0.366
Determining teachers' salaries increases:				
- Completely or Partially decentralised			0.054	0.225
- Centralised			0.947	0.225
Formulating school budget:				
- Completely or Partially decentralised	0.497	0.500		
- Centralised	0.503	0.500		
Establishing student assessment policies:				
- Completely or Partially decentralised	0.140	0.347	0.196	0.397
- Centralised	0.860	0.347	0.804	0.397
Determining course content:				
- Completely or Partially decentralised			0.093	0.291
- Centralised			0.907	0.291
Autonomy Management				
Hiring and firing teachers	0.042	0.201	0.092	0.289
Determining teachers' salaries increases	0.022	0.148	0.085	0.278
Formulating school budget	0.327	0.469	0.901	0.299
Deciding on budget allocations	0.920	0.272	0.874	0.332
Establishing student assessment policies	0.304	0.460	0.432	0.495
Approving students' admission to school	0.934	0.248	0.898	0.303
Choosing textbooks	0.022	0.146	0.099	0.298
Determining course content	0.158	0.364	0.079	0.270
Ownership and Funding				
Public School	0.978	0.148	0.862	0.345
Private school	0.022	0.148	0.138	0.345
Private Funding (>20%)	0.242	0.428	0.157	0.364
Competition (yes)	0.655	0.476	0.724	0.447
Accountability				
No parental pressure	0.454	0.498	0.308	0.462
Parental pressure (Minority)	0.393	0.489	0.393	0.488
Parental pressure (Majority)	0.153	0.360	0.300	0.458
Comparing students' assessments to district/national performance or other schools	0.897	0.305	0.827	0.378
Posting achievement data publicly	0.064	0.245	0.219	0.414

Source: Authors' calculations.

Table 2: Tunisia School Autonomy Regression Results (Whole Sample)

	Mathematics	**Reading**
Constant	132.066**	451.150***
	(65.807)	(88.904)
Institutional Settings		
Autonomy Management		
Hiring and firing teachers	4.441	4.539
	(11.824)	(9.846)
Formulating school budget	-8.639	1.009
	(5.389)	(4.830)
Deciding on budget allocations	-3.019	-0.045
	(5.673)	(5.637)
Establishing student assessment policies	-3.171	-5.809
	(4.609)	(4.739)
Approving students' admission to school	-9.057	-0.311
	(8.903)	(9.136)
Choosing textbooks	-6.148	-15.989
	(10.667)	(13.778)
Determining course content	-2.453	3.080
	(5.259)	(4.417)
Ownership and Funding		
Private school	-56.638***	-51.711***
	(14.701)	(13.583)
Private Funding (>25%)	9.3645*	9.746*
	(5.072)	(5.338)
Competition	-4.006	-0.061
	(5.490)	(4.889)
Accountability		
Parental pressure (Minority)	0.729	1.193
	(4.437)	(4.007)
Parental pressure (Majority)	11.911*	10.622*
	(6.766)	(6.116)
Comparing students' assessments to district/national performance or other schools	10.095	12.751**
	(7.522)	(5.037)
Posting achievement data publicly	-3.665	8.112
	(7.706)	(7.891)
Student and Family Characteristics	Yes	Yes
School Factors	Yes	Yes
N observations	4,872	4,872

Source: Authors' calculations.

Table 3: Tunisia Decentralisation Regression Results (Subsample)

	Hiring and Firing Teachers		*Formulating School Budget*		*Establishing student assessment policies*	
	Mathematics	**Reading**	**Mathematics**	**Reading**	**Mathematics**	**Reading**
Constant	120.099*	231.773***	148.026**	274.317***	96.811	191.855**
	(60.862)	(66.212)	(67.763)	(71.352)	(79.811)	(72.186)
Institutional Settings						
Decentralisation						
Hiring and Firing teachers	-4.367	-5.860				
	(5.566)	(4.946)				
Formulating school budget			6.865*	0.379		
			(3.747)	(3.921)		
Establishing student assessment policies					10.719*	0.712
					(6.180)	(6.001)
Autonomy Management						
Hiring and firing teachers	1.877	6.639	9.699	-2.102	1.697	-0.492
	(13.456)	(10.694)	(11.506)	(9.852)	(11.132)	(8.028)
Formulating school budget	-11.409**	-0.523	-12.304**	0.424	-10.060*	5.028
	(5.236)	(4.684)	(5.453)	(4.984)	(5.639)	(4.407)
Deciding on budget allocations	-1.587	-1.007	-5.181	-10.570**	-3.214	-1.276
	(5.991)	(5.634)	(5.646)	(5.085)	(7.080)	(5.354)
Establishing student assessment policies	1.445	-3.210	-0.230	-4.738	-9.308	-9.665
	(4.352)	(4.583)	(4.227)	(4.813)	(6.567)	(6.514)
Approving students' admission to school	-7.677	-0.428	-14.827	-0.614	-9.038	3.379
	(8.684)	(9.773)	(9.999)	(11.618)	(8.742)	(8.617)
Choosing textbooks	-5.973	12.626	-0.379	15.741*	-60.577**	-65.559
	(13.290)	(8.394)	(11.906)	(8.560)	(24.008)	(31.262)
Determining course content	2.851	8.932*	-3.196	7.649	0.744	4.815
	(5.165)	(4.626)	(4.948)	(4.857)	(5.836)	(4.485)
Private Funding (>25%)	11.147**	11.390**	11.102**	10.447*	13.928**	12.662**
	(5.035)	(5.322)	(5.504)	(5.386)	(5.615)	(5.222)

	Mathematics	Reading	Mathematics	Reading	Mathematics	Reading
Competition	4.266	0.247	8.243	2.959	8.745	2.460
	(5.154)	(4.630)	(5.017)	(4.247)	(5.523)	(4.632)
Accountability						
Parental pressure (Minority)	-0.706	3.597	4.808	5.024	-0.083	7.611*
	(4.269)	(4.276)	(4.217)	(4.554)	(5.003)	(4.384)
	5.573	9.242	16.587***	14.751**	4.014	9.412
Parental pressure (Majority)	(0.387)	(5.906)	(6.101)	(6.322)	(7.331)	(5.956)
Comparing students' assessments to district/national	18.530**	14.704***	15.683**	14.276**	17.254**	11.777*
performance or other schools	(7.136)	(5.134)	(7.540)	(5.549)	(8.233)	(6.185)
Posting achievement data publicly	8.838	14.858*	2.750	14.242*	5.138	10.359
	(6.644)	(7.535)	(6.350)	(7.451)	(7.249)	(6.512)
Student and Family Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
School Factors	Yes	Yes	Yes	Yes	Yes	Yes
N observations	4,744	4,744	4,142	4,142	3,977	3,977

Source: Authors' calculations.

Table 4: Jordan School Autonomy Regression Results (Whole Sample)

	Mathematics	**Reading**
Constant	116.609	188.402**
	(108.127)	(86.107)
Institutional Settings		
Autonomy Management		
Hiring and firing teachers	-55.727**	-19.704
	(24.027)	(22.789)
Determining teachers' salaries increases	14.932	-13.893
	(21.837)	(23.672)
Formulating school budget	12.040	-4.923
	(12.594)	(11.011)
Deciding on budget allocations	-11.587	8.449
	(9.743)	(10.179)
Establishing student assessment policies	-8.335	-6.051
	(8.705)	(7.099)
Approving students' admission to school	-8.286	-19.312*
	(11.994)	(10.210)
Choosing textbooks	3.511	-0.606
	(12.337)	(11.198)
Determining course content	-17.390	-19.194
	(16.026)	(15.038)
Ownership and Funding		
Private school	31.712	1.474
	(26.078)	(22.366)
Private Funding (>25%)	4.082	35.954*
	(24.257)	(21.494)
Competition	14.870*	9.812
	(8.268)	(6.996)
Accountability		
Parental pressure (Minority)	16.567*	11.528*
	(8.750)	(6.675)
Parental pressure (Majority)	26.633**	15.020
	(10.327)	(9.986)
Comparing students' assessments to district/national performance or other schools	19.868*	20.271**
	(10.695)	(9.977)
Posting achievement data publicly	-11.624	-10.398*
	(10.594)	(9.410)
Student and Family Characteristics	Yes	Yes
School Factors	Yes	Yes
N observations	6,322	6,322

Source: Authors' calculations.

Table 5: Jordan Decentralisation Regression Results (Subsample)

	Hiring and Firing Teachers		*Determining teachers' salaries increases*		*Establishing student assessment policies*		*Determining course content*	
	Mathematics	**Reading**	**Mathematics**	**Reading**	**Mathematics**	**Reading**	**Mathematics**	**Reading**
Constant	63.142 (117.750)	137.422 (96.736)	51.538 (113.806)	122.881 (95.440)	-18.413 (138.588)	73.068 (115.014)	94.890 (119.214)	163.264 (99.025)
Institutional settings *Decentralisation*								
Hiring and firing teachers	16.176* (9.059)	4.729 (6.872)						
Determining teachers' salaries increases			48.209*** (13.780)	27.644*** (9.789)				
Establishing student assessment policies					4.839 (13.329)	12.645 (10.573)		
Determining course content							-8.127 (13.589)	-0.915 (10.473)
Autonomy Management								
Hiring and firing teachers	-66.219*** (24.826)	-37.020* (18.850)	-70.022*** (24.816)	-29.175* (17.050)	-34.219 (25.156)	-11.898 (21.063)	-48.414** (24.226)	-19.567 (19.162)
Determining teachers' salaries increases	45.713*** (16.850)	26.852** (12.995)	54.822*** (18.953)	21.475 (13.685)	-25.478 (33.016)	-57.491** (25.501)	19.966 (14.708)	-14.538 (13.556)
Formulating school budget	23.440* (12.510)	2.430 (10.656)	26.549** (12.334)	3.493 (9.933)	28.641* (15.877)	17.118 (14.093)	16.638 (12.432)	-9.942 (10.845)
Deciding on budget allocations	-8.647 (10.800)	10.900 (10.646)	-12.744 (8.984)	8.913 (9.558)	-6.527 (15.923)	0.441 (13.549)	-8.464 (10.487)	9.9197 (9.119)

	Mathematics	Reading	Mathematics	Reading	Mathematics	Reading	Mathematics	Reading
Establishing student assessment policies	-11.776 (7.790)	-8.460 (6.107)	-16.169** (7.608)	-11.360* (6.034)	-38.713** (14.655)	-37.532*** (12.615)	0.775 (8.340)	2.954 (6.451)
Approving students' admission to school	1.452 (20.268)	-12.335 (7.886)	2.364 (10.169)	-10.609 (7.750)	-10.537 (11.053)	-12.846 (9.013)	-15.020 (11.335)	-22.117** (9.990)
Choosing textbooks	7.735 (11.506)	3.851 (10.092)	3.072 (11.284)	0.895 (10.816)	-16.906 (19.322)	-7.657 (14.617)	20.884 (13.350)	3.147 (11.833)
Determining course content	7.745 (13.513)	6.282 (10.654)	17.898 (11.112)	9.695 (9.178)	27.894** (11.662)	3.150 (15.284)	16.775 (18.553)	-11.947 (16.891)
Private Funding (>25%)	24.417* (12.817)	35.785*** (10.605)	-2.245 (14.404)	17.888 (11.500)	25.932 (17.537)	34.556** (17.239)	30.226** (12.339)	34.537*** (11.132)
Competition	17.918** (7.343)	12.323** (5.782)	14.945** (7.394)	11.224** (5.523)	14.281 (11.322)	9.083 (9.946)	20.404*** (7.631)	15.243** (5.845)
Accountability								
Parental pressure (Minority)	16.824* (9.273)	6.449 (6.562)	18.786** (8.755)	7.102 (6.546)	23.425* (11.924)	19.288** (8.925)	15.934* (9.246)	4.586 (6.685)
Parental pressure (Majority)	20.977* (12.052)	6.679 (8.207)	24.794** (11.451)	7.814 (8.123)	36.957** (15.642)	30.575*** (11.093)	21.226* (10.968)	0.244 (7.606)
Comparing students' assessments to district/national performance or other school	14.415 (9.787)	12.323** (5.782)	16.470 (10.325)	8.996 (6.816)	9.593 (11.783)	18.488* (9.946)	8.856 (9.830)	5.874 (6.869)
Posting achievement data publicly	-8.872 (9.470)	-12.960 (8.013)	-10.656 (9.531)	-12.628 (7.774)	-35.607** (13.579)	-31.051** (12.398)	-10.693 (9.132)	-10.433 (7.216)
Student and Family Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
School Factors	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N observations	5,804	5,804	5,804	5,804	3,752	3,752	5,805	5,805

Source: Authors' calculations.

2011

2011/1, Oppedisano, V; Turati, G.: "What are the causes of educational inequalities and of their evolution over time in Europe? Evidence from PISA"
2011/2, Dahlberg, M; Edmark, K; Lundqvist, H.: "Ethnic diversity and preferences for redistribution"
2011/3, Canova, L.; Vaglio, A.: "Why do educated mothers matter? A model of parental help"
2011/4, Delgado, F.J.; Lago-Peñas, S.; Mayor, M.: "On the determinants of local tax rates: new evidence from Spain"
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2011/6, Duch, N.; García-Estévez, J.; Parellada, M.: "Universities and regional economic growth in Spanish regions"
2011/7, Duch, N.; García-Estévez, J.: "Do universities affect firms' location decisions? Evidence from Spain"
2011/8, Dahlberg, M.; Mörk, E.: "Is there an election cycle in public employment? Separating time effects from election year effects"
2011/9, Costas-Pérez, E.; Solé-Ollé, A.; Sorribas-Navarro, P.: "Corruption scandals, press reporting, and accountability. Evidence from Spanish mayors"
2011/10, Choi, A.; Calero, J.; Escardíbul, J.O.: "Hell to touch the sky? Private tutoring and academic achievement in Korea"
2011/11, Mira Godinho, M.; Cartaxo, R.: "University patenting, licensing and technology transfer: how organizational context and available resources determine performance"
2011/12, Duch-Brown, N.; García-Quevedo, J.; Montolio, D.: "The link between public support and private R&D effort: What is the optimal subsidy?"
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