

# Impact of Educational Public Policy on Schooling in Morocco: A Temporal and Transverse Analysis

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## Abstract

Morocco has made major advances in the education in primary and secondary levels, mainly because of targeted public policies that had placed the generalization of Education at head of their concerns since independence. However, despite the efforts made, many studies reveal the persistence of important problems, related in particular to the increase of regional disparities and importance of inequalities in access to school between boys and girls. However, the Moroccan education system still has a low student performance, with high dropout and repetition rate and moderate level of secondary schooling. This can be partially explained by several factors including household income, the characteristics of the labor market, rural and urban distribution, parental education, etc. Public policy could also be the cause of the problems plaguing the country's education system. This study aims to test the validity of the effects of three public policy instruments (basic infrastructure, management, and direct aid) on the enrolment rate for pre-school, primary, secondary and college levels.

To conduct this study, we retained 27 variables which concern three categories: product, result and impacts. A principal component analysis (PCA) had been carried out from 2002 to 2012, in order to identify the most statistically correlated variables with enrollment rates. Then, a regression models with panel data were used to test the relevant effects of public policy on enrolment rate by level. The results indicate the presence of statistically significant effects of the basic infrastructure on increasing enrolment rate, especially the number of classrooms and the staff.

**Keywords:** educative policy, econometric panels

## 1. Introduction

Morocco has made significant progress in increasing access to education and implemented a great number of strategies, which had contributed to improve schooling rates in primary, collegial and secondary levels. In this regard, it is important to underscore the evolution of education policies, which started the first years after independence by the adoption of unification, moroccanisation, generalization and arabisation principles. It developed thereafter by the implementation in 1973 of training teachers programs and by a global reform aimed to facilitate access to education for disadvantaged groups at the beginning of the 1980s. In 1994, a new phase based on opening of the school to its environment, the involvement of new participant and the rationalization of resources began. The creation of regional academies and the implementation of the National Charter marked the culmination of this phase. As results, the net enrolment rates have improved appreciably at the national level and in urban areas.

In return, the disparities between females and males and between urban and rural areas have increased, affecting the student's performance. This can be partially explained by several factors including household income, the characteristics of the labor market, rural and urban distribution, parental education, etc. Public policy could also be the cause of the problems plaguing the country's education system.

This study aims to examine the effects of educational public policy on the schooling rates and to present the trends of education indicators in Morocco. In particular, it articulated to evaluate if the construction of schools and the strengthening educational staff were appropriate feeding choices around education public policies. This will make it possible to draw lessons about the suitable policies required to improve the quality and efficiency of

education and training.

The remainder of the present paper is structured as follows: the second point provides a brief review of literature. The educational context in Morocco is presented in the third point, which is followed in the fourth by a presentation of data and methodology. The fifth point gives insights on the results of the econometric treatments. The last concludes.

## 2. Review of Literature

The determinants of education were at the central concerns of many economists and sociologists, focused on developing a theoretical framework and empirical production function of education. The pioneering study was carried out by Coleman (1966) because of its role in reviving the debate about the determinants of scholastic skills. Rather, the study highlighted the importance of ethnicity and race of students in assessing educational outcomes as well as the effect of family conditions during all years of schooling. Colman's findings have been criticized particularly because of the estimation methods which not akin with a theoretical production function.

Emmanuel Jimenez (1985) used flexible cost functions to evaluate the possible complementarities between different levels of education. The study revealed an important degree of substitution between inputs of education. The effects of class size on economies of scale and marginal costs of higher education have been experienced by Nelson and Hevert (1992). A Translog function multi-product cost was estimated from data relating to a single university. The authors showed that the effects of omission control of the size of the classrooms resulted in biased estimates of economies of scale and marginal costs.

Other studies were interested in modeling and assessing the results of the standardized tests of school output, like one of the principal criteria of the educational production. Others used quantitative measurements, like the schooling rates, the completion of the years of schooling rate, the school dropout rate of or the number of years of schooling.

The estimate of the educational production function was confronted with the question of the choice of education indicator. Wilson (2001) indicated that about two thirds of the studies examined for this purpose, choose indicators of quality of teaching (performance of the students to the tests), whereas the other third was devoted to the study of the quantity of schooling (a number of years of schooling).

Bertola and Cecchi (2003) considered the individual and social outputs of education. They briefly presented the methods according how the financial resources of schools affect the quantity, the quality and the heterogeneity of the educational offer. In the prolongation, the roles of the public expenditure in determining the educational production function. For Jenkins, Levacic and Vignoles (2008), the lack of the incentives for the pupils and the teachers can constitute a basic problem, which tends to reduce the effect of the public utility in the determination of the productive function of education.

## 3. Educational Context in Morocco



Figure 1. Public expenditure on education, % of government spending, 2011-2012

Source: Ministry of Education, World Bank.

Morocco has invested heavily in education in recent years. This commitment of the Moroccan government has materialized, first, through public policies implemented to improve the education system. This led in place of

Emergency Plan launched in 2009 to enable the implementation of the objectives of the National Charter of Education and Training (NECS). Second, the financing of the education system has also grown, with an increase of the share of the budget devoted to public spending on education. The most recent data show that Morocco has surpassed all comparator countries with a share of around 24.8% (Figure 1).

As results of these efforts, the primary education rates increased appreciably and its generalization is close. From 59% in 1980, it rose to 97% in 2012, with a very small difference between places of residence. The improvement was particularly observed for the rural girl's enrolment rate which has more than quadrupled between 1990 and 2011, rising from 22% to 96% of children of age group (Figure 2). It should also be noted that the repetition and dropout rates were very low in the primary education, not exceeding 8% and 3% in 2012. The completion rate is high at almost 86%.



Figure 2. Enrolement rate at the primary

Source: Ministry of Education, World Bank.

By contrast, the secondary school enrolment rates remain modest and heterogeneous. Thus, at the college level, the net enrolment rate of children aged between 12 and 14 years, does not exceed 53.9% , with significant differences between regions and gender (girls enrolment rate is 23.6%in rural areas against 78.7% for urban). Similar results were obtained in the qualifying secondary, where the rate does not exceed 28% in 2010/2011 for children aged between 15 and 17 years. In addition, a very large disparity between medium of residence is registered (5.4% in rural areas, 5.6% for boys and 5.1% for girls). The lack of school infrastructure, roads and transport in some areas makes access very difficult to school. Moreover, the quality of secondary education (college and qualifying cycles) remains low in Morocco, taking account of a completion rate in both cycles of 65% and 37.5%, respectively (Table 1).

Table 1. Indicators of education, 2008-2012

		2008-2009	2009-2010	2010-2011	2011-2012
<i>Primary education</i>	<i>Repetition average rate</i>	12,3	12	9,3	8,2
	<i>Drop-out average rate</i>	4,6	3,3	3,1	3,2
	<i>Completion rate</i>	76	83	86,5	86,2
<i>Collegial</i>	<i>Repetition average rate</i>	15,2	16,1	16,3	16
	<i>Drop-out average rate</i>	13,1	12,9	10,8	10,4
	<i>Completion rate</i>	52	57	64,6	65,3
<i>Qualifying</i>	<i>Repetition average rate</i>	19,2	18,8	18,1	17,1
	<i>Drop-out average rate</i>	14,1	11,9	9,2	11
	<i>Completion rate</i>	26	30	36,2	37,5

Source: Ministry of Education.

In view of the results, it's no surprise that the average years of schooling in Morocco are not high. It should be recalled that the length of schooling was below 6 months (0.4 years) in 1960. Over the following fifty years, the average number of years of schooling for population aged of 15 and over has increased gradually to reach 5

years in 2010. This gain is less than that recorded in the comparator countries and the rest of the Arab countries.

Overall, the efforts of successive governments had contributed in an improvement of education, especially in the primary level, but many gaps remain important. In fact, the literacy level is relatively low compared to referent countries, show average rate of over than 90%, with the exception of Tunisia, where the level is around 79%. In addition, statistics show the persistence of inequalities between men and women in literacy. Significant disparities are also detected between areas: illiteracy affects 39% of the total population aged of 10 years and over, 50% of rural population and 65% of rural women.

#### 4. Methodology and Data

The study pertains to a sample of the sixteen regions of the kingdom, covering a period from 2002 to 2012. 27 variables classified into three levels: outputs, outcomes and results have been identified and have undergone specific treatments. Data were collected from the Ministry of Education.

The choice of the specification models is framed by the content of the logical framework and theoretical evaluation commonly accepted and internalized the arguments of the educational production function. Annex 1 presents the theoretical specifications of education indicators with an indication of expected signs.

Explanatory variables included in the final statistical model were selected by an iterative procedure; which involves conducting successively the following steps:

- Step 1: identify, among the explanatory variables, those having a theoretical link with results variables;
- Step 2: conducting a principal components analysis (PCA) so to retain the independent variables, being more empirically correlated with results, varying among those short listed in step 1. The calculation of correlations is, in addition, leads to some potentially relevant variables products in conjunction with some result indicators;
- Step 3: specify model panel data regressions, which identifies the explanatory variables and check the existence of regional differences (fixed or random effects models). We used for this purpose, Hausman test.
- Step 4: modify non-relevant specifications and retain parsimonious model that presents a satisfactory degree of explanation that a recursive method for each variable. This exercise was conducted through a review of the parameters, their signs and analyzing statistics like the Student and the Fischer tests, R2 (Within ...).

Econometric specifications adopted allow highlighting the relationship between the dependent variables and the explanatory variables. The specification that is applied takes the following functional form:  $Y = F(W)$  With Y: results variables vector for education and W: explanatory variables vector.

Using panel models and data of the sixteen regions, we examined the relationship between the determinants of result indicators for education. This review captures the effects of regional differences in the development of education expressing the priority objectives of public policy. These include the:

- Preschool enrolment rate;
- Primary enrolment rate;
- Collegial enrolment rate;
- Qualifying secondary enrolment rate.

#### 5. Presentation of Results

This is to combine a simple descriptive analysis based on the calculation of the average rates of education indicators between two periods with the results from econometric panel data treatment, in particular when regional differences exist. It proves that the inclusion of "the effect of the regions' sheds light on the behavior of education between each region.

##### 5.1 Preschool Enrolment Rate

Preliminary analysis of data related to the phase between the periods 2002-2008 and 2009-2012, marked by the implementation of the Emergency Plan for Education, shows a slight improvement in preschool average enrolment rate. The latter increased from 53.3% to 62.3% at the national level. Regionally, the most remarkable finding concerned the regions of Oued Ed-Dahab-Lagouira, Laayoune-Boujdour-Sakia the Hamra, Guelmim Smara, Great Casablanca and Meknes-Tafilalet, with a fall of around 10 points.

Thus, we propose to test whether a public policy aimed at improving basic educational infrastructure in the preschool had encouraged households to enroll their children in preschool. It is, in this case, to assess how extent of the number of classrooms and education personnel staff has been in contributing to improving education and whether these variables are causing an increase in the preschool rate of in the regions.

The model results confirm the significant effect of the number of classrooms in improving the preschool enrolment rate, with a sign closely aligned with the expected. The higher the number of preschool classrooms, the greater is the gross preschool enrolment rate. Specifically, an increase in preschool classrooms by one unit leads to an improvement by 0.005 points in the preschool average enrolment rate.

Table 2. Specification of the preschool enrolment rate

Estimator	Expected sign	MCG
A number of pre-school rooms by 1000 inhabitants	+	13.240 (3.01)
A number of pre-school teachers per 1000 inhabitant	+	1.881 (2.35)
Fixed effects		
02- Laayoune-Bojdour-Sakia Hamra		-22.940
03- Guelmim-Smara		-0.811
04- Souss-Massa-Draa		-51.288
05- El Gharb-Chrarda-Bni Hssaine		-59.495
06- Chouia-Ourdigha		-48.486
07- Marrakech-Tensift-El Haouz		-41.228
08- Eastern Area		-57.412
09- Grand Casablanca		-6.804
10- Rabat-Sale-Zemmour-Zaer		-28.142
11- Doukkala-Abda		-69.404
12- Tadla-Azilal		-59.430
13- Meknes-Tafilalet		-8.909
14- Fes-Boulemane		-40.261
15- Taza-Al Hoceima-Taounate		-50.952
16- Tanger-Tetouan		-31.455
Constant		79.931
R-squared (Between)		0.232
R-squared (Within)		0.171
Rho (Fraction of the variance due has $u_i$ )		0.882
P-been worth test of Hausman		0.450
Fisher		78.76
Nombre observations (areas)		176

Note. \* Significativity with 5%.

### 5.2 Net Primary Enrolment Rates (6-11 Years)

Analysis of the data leading up to and after the emergency plan period reveals a continuation bullish movement of the net primary enrolment, growing from 92.0% to 94.8%, at national level. Regionally, this slight increase was marked the whole of Morocco's regions, with the exception of Souss-Massa-Draa and Taza-Al Hoceima-Taounate regions.

Identifying the factors behind this improvement of the primary enrolment rate by reference to public policy requires specific models. Thus, we are interested to assess whether the development of the educational infrastructure in rural and urban areas, increase of teachers and supervisors in both medium and development of school canteens could promote higher enrolment of children in primary school.

It arises that most relevant variables, which explain the primary enrolment rate, are in the order as follows: the number of primary schools and the staff ratio in urban areas, the support rate, the school canteens and the number of rural primary schools in rural medium. In addition, their signs compared to the net primary enrolment rate are in conformity with what is expected in theory. Specifically, an increase by one unit of the number of primary schools in the urban areas leads to a raise by 0.06 points of the net primary enrolment rate. In addition, it should be noted that an expansion by one point of the supervision rate in the urban areas generates a gain by 0.197 point of the net primary enrolment rate, while a one point increase of the rate framing the rural environment results in a relatively important effect (0.213 points). Finally, a rise by one unit of the school canteens in rural areas creates a strengthening by only 0.001 points of the net primary enrolment rate.

Having identified the determinants of the primary enrolment rate, we can explain the results recorded in all

regions of Morocco except for the Souss-Massa-Draa and the Taza-Al Hoceima-Taounate, where the parameter of the constant is important. The parameters are more remarkable in the southern regions of Morocco: Region 2 and Region 3 with the value of parameters around of 5971 and 2765 respectively.

Table 3. Specification of the primary enrolment rate (6-11 years)

Estimator	Expected sign	MCG
Number of primary schools in urban environment for 1000 inhabitants	+	35.556 (23.835)
Rate of urban framing	+	0.153 (0.071)
Rate of rural framing	+	0.264 (0.085)
Fixed effects		
02- Laayoune-Bojdour-Sakia Hamra		6.700
03- Guelmim-Smara		3.324
04- Souss-Massa-Draa		-19.166
05- El Gharb-Chrarda-Bni Hssaine		-6.034
06- Chouia-Ourdigha		1.462
07- Marrakech-Tensift-El Haouz		-5.562
08- Eastern Area		-7.178
09- Grand Casablanca		4.878
10- Rabat-Sale-Zemmour-Zaer		-2.842
11- Doukkala-Abda		-9.668
12- Tadla-Azilal		-4.672
13- Meknes-Tafilalet		0.163
14- Fes-Boulemane		-2.587
15- Taza-Al Hoceima-Taounate		-13.943
16- Tanger-Tetouan		-6.104
Constant		79.160
R-squared (Between)		0.084
R-squared (Within)		0.155
Rho (Fraction of the variance due has $u_i$ )		0.836
P-been worth test of Hausman		0.000
Fisher		4.81
observations number (areas)		176

Note. \* Significativity with 5%.

### 5.3 Net Collegial Enrolment Rate (12-14 Years)

Comparing the period before the implementation of the emergency plan with one that followed also confirms a clear strengthening of the net average college enrolment rate, which had increased at the national level from 36.7% to 49.3%. At regional level, the increase is noticeable in the regions of Laayoune-Boujdour-Sakia, Great Casablanca and the Rabat-Salé-Zemmour-Zaer. Conversely, relatively low rates were recorded in other regions of Morocco.

By adopting the same procedure for assessing the role of public policy in improving college completion, we evaluated the effects of educational infrastructure and providing incentives such as grants, scholarships and school canteens ... ) on the net collegial enrolment rate.

The results of econometric models allows for the identification of the most relevant explanatory variables classified as follows: number of urban settlements, number of internal, number of the school canteens in rural areas. These relevant variables also show signs aligned to the expected results. Indeed, an increasing of the number of establishment by one unit (establishment) contributes to a gain by 0.057 points of the net collegial enrolment rate, while a rise of the number of the internal by one unit boosts the net collegial rate enrolment by 0,002 points. Moreover, the strengthening of the number of beneficiaries of school canteens in rural areas by one unit, leads to an expansion by 0.156 points. Note, however, that the only non-relevant variable in this model was the number of fellows, which has been rejected by the appropriate tests.

As for the primary, the Hausman test results served to retain the fixed effect model, which is expected given that Morocco behaviour of school children by region is not the same. It is introducing improvement of R2 coefficient

(Within) from 0.35 to 0.94. Public policy factors identified above explain the good results in the regions of Laayoune-Boujdour-Sakia, Great Casablanca and the Rabat-Salé-Zemmour-Zear.

Table 4. Specification of the collegial enrolment rate (12-14 years)

Estimator	Expected sign	MCG
Urban Établissements for 1000 inhabitants	+	257.620 (33.308)
Number of school recipients of canteens (rural) for 1000 inhabitants	+	5.497 (0.669)
Number of stock-brokers for 1000 inhabitants	+	2.671 (0.956)
Fixed effects		
02- Laayoune-Bojdour-Sakia Hamra		8.938
03- Guelmim-Smara		-17.211
04- Souss-Massa-Draa		-31.619
05- El Gharb-Chrarda-Bni Hssaine		-15.728
06- Chouia-Ourdigha		-17.627
07- Marrakech-Tensift-El Haouz		-22.162
08- Eastern Area		-14.353
09- Grand Casablanca		15.479
10- Rabat-Sale-Zemmour-Zaer		1.130
11- Doukkala-Abda		-21.947
12- Tadla-Azilal		-13.605
13- Meknes-Tafilalet		-19.750
14- Fes-Boulemane		-14.355
15- Taza-Al Hoceima-Taounate		-33.359
16- Tanger-Tetouan		-19.524
Constant		45.418
R-squared (Between)		0.000
R-squared (Within)		0.540
Rho (Fraction of the variance due has $u_i$ )		0.959
P-been wort test of Hausman		0.000
Fisher		61.67
Nombre observations (areas)		176

Note. \* Significativity with 5%.

#### 5.4 Net Qualifying Secondary Enrolment Rate

The analysis of the evolution of the qualifying secondary schooling by region and by period, especially before and after the implementation of the Emergency Plan in 2009 attest to a slight improvement in its average rate, especially if we compare its evolution to the performance recorded in the previous levels. Thus, at national level, the rate increased from 16.3% to 25.8%. At regional level, some improvements are visible in the regions of Oued Ed-Dahab-Lagouira, Laayoune-Boujdour-Sakia the Hamra and the Great Casablanca. For the other regions, this rate does not exceed 36%.

As a reminder, the comparison of the average net enrolment rate in qualifying secondary per period and region, aimed to identify trends varying results explain by reference to econometric models and to identify factors driving these trends.

The analysis of the model results show that the suggested variables such as the number of facilities has a sign consistent with what is expected, while the variables “rate of urban and rural management are not relevant although their signs were closely aligned with what is expected,. Overall, an increase in the number of establishments by one unit generates an increase of 0.269 point of the net enrolment rate in qualifying secondary. This could be explained by the significant deficit in the constructions of specialized institutions at secondary level.

Furthermore, it should be emphasized that the effect of the number of institutions affects positively the net enrolment rate at the secondary qualifying differently from one region to another (cf. fixed effects expressed by constant related to the regions). These determinants explain the good results recorded in regions 2, Laayoune-Boujdour-Sakia the Hamra with a value of the constant around 7784, Region 9, the great Casablanca

with 22,141. By contrast, the least favorable results are recorded in region 4, the Souss Massa Daraa with a value of the constant around 47,832.

Table 5. Specification of the rate Net of schooling to the qualifying secondary (15-17ans)

Estimator	Expected sign	MCG
Number of establishments for 1000 inhabitants	+	498.394 (45.206)
Rate of urban framing for 1000 inhabitants	+	0.067 (0.083)
Fixed effects		
02- Laayoune-Bojdour-Sakia Hamra		-3.926
03- Guelmim-Smara		-14.846
04- Souss-Massa-Draa		-15.624
05- El Gharb-Chrarda-Bni Hssaine		-9.931
06- Chouia-Ourdigha		-8.412
07- Marrakech-Tensift-El Haouz		-8.858
08- Eastern Area		-6.935
09- Grand Casablanca		12.576
10- Rabat-Sale-Zemmour-Zaer		1.754
11- Doukkala-Abda		-7.711
12- Tadla-Azilal		-8.616
13- Meknes-Tafilalet		-5.247
14- Fes-Boulemane		-5.379
15- Taza-Al Hoceima-Taounate		-13.429
16- Tanger-Tetouan		-8.673
Constant		14.890
R-squared (Between)		0.408
R-squared (Within)		0.531
Rho (Fraction of the variance due has $u_i$ )		0.858
P-been worth test of Hausman		0.000
Fisher		89.65
A number of observations (areas)		176

Note. \* Significativity with 5%.

## 6. Conclusion

Morocco has invested heavily in education in recent years. This commitment by the Moroccan government has materialized through the development sector funding programs, as also evidenced by the increase in the share of the budget allocated to public expenditure in education at all levels. In addition, we noted also the effect of the implementation of public policies supporting these funding, including the launch of an Emergency Plan, in 2009, in order to enable the achievement of the objectives of the National Charter of Education and training (NECS).

From our analysis, it emerges that public policies, focused on increasing the personnel, the number of school canteens and boarding schools, have significant positive effects on primary school enrolment, mainly because of shortfalls in the matter, considered more important the construction of schools. At secondary level, where the deficit in basic infrastructure is important, the effect of increasing the number of constructed facilities is crucial.

To conclude, this analysis highlighted the positive effect of educational public policy. However, public efforts should be maintained to generalize education especially in rural areas and improving its performance through an acceleration of the sector basic infrastructure development programs. It is also useful to greater synergy and coordination between public and private operators in order to assess policies and adequate education strategies that could promote a significant improvement of the Moroccan education system and its performance on a medium-term horizon.

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