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Institutional Quality, Reforms and Integration in the Maghreb

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Abstract

Using panel data this paper examines the effects of institutions on the success of reforms and integration in the Maghreb. Institutional quality measures are developed using fuzzy-set based transformations of civil liberties and political rights. We posit that these transformations are quite appropriate given the nature of freedom indicators. We show that using *fuzzy-set transformed* measures provides useful insights regarding the quality of institutions in Algeria, Morocco and Tunisia. Furthermore, our empirical results suggest that institutions play a significant role in the success or failure of economic reforms. This conclusion is in clear contrast to views that propose a sequencing in which civil liberties and political rights should come after economic reforms are already in place and fully operational.

Keywords: institutions, Maghreb, economic reform

JEL classification: F14, O19, O55

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Tables are given at the end.

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1 Introduction

For over two decades now developing countries around the world have been implementing a range of policy reforms. Chief among these reforms are those related to trade, which govern to a large extent a country's economic relations with the rest of the world. Trade policy reforms are often evaluated (given scores and rankings) by consultants and economists to determine whether countries are indeed reforming. Financial reforms have also become popular since the mid-1980s and are subject to evaluation by investment banks and international financial institutions. Some of the reforms undertaken by developing countries have come after thorough studies of the dynamics of their economies, with a significant attention given to regional differences within the same country and after consulting their constituents. On the other hand, in other countries, these reforms were hastily decided by the central government or international lenders with little or no regard to the socioeconomic and institutional realities in the country adopting the reforms. Two examples from the Maghreb in the 1980s are illustrative of the later type of reforms. In January 1984, the Tunisian government's removal of food subsidies as part of the stabilization programme (World Bank and IMF) resulted in bloody riots and substantial material damage. During the same month, similar riots took place in Morocco in all major cities. The riots in Morocco were triggered by rumours that the official proposals (made at the end of the December 1983) to increase the price of basic commodities, including food, were going to be implemented. In both countries the social unrest was a response to the fact that reforms ignored some basic realities. In both economies food items, particularly bread, tend to have not only an economic (consumption) value but they play a cultural role as well, especially for the low-income groups.

The way people conduct their daily lives is imbedded in institutions, not policies dictated by governments or outside organizations. This includes the decision of a society to rely on exports (see for example, the discussion by North 1991 on how institutions can help to capture gains from trade). East Asian countries are an illustration of this. Singapore, for instance, has opted to be export oriented but both its human capital and its institutions had to adjust to be consistent with this orientation.

It is clear that while the decision to follow specific policies can be subject to influence from institutions, sometimes policies are recommended or dictated by lenders and donors and hence governments end up with little or no choice but to implement them. When institutions are not in tandem with such reforms, expected results may not materialize. This is one explanation for the frequent breakdown in donor-initiated reform programmes

A growing body of literature has examined the links between institutions, trade and income using cross-sectional data. Recent studies include Kaufmann *et al.* (1999), Acemoglu *et al*. (2001), Rodrik *et al.* (2002), Rodrik (2000a,b, and 2002), and Dollar and Kraay (2003). The question we want to ask is: 'do institutions explain why some countries have benefited from openness to trade and capital (a major aspect of globalization) while others did not?' Two directions of research follow from this question. First, it may be interesting to study why some countries do not seem to have undertaken appropriate reforms, in the sense that their governments did not implement the kind of trade policies known (at least in theory or from the experience of some Asian countries) to be conducive to economic development and growth. A second

research avenue focuses on those countries that seem to have genuinely opted for this type of policies but with no significant results. It is our view that this avenue is a more interesting one to pursue and we conjecture that institutions play an important role in the success or failure of policy reforms.

Most recent work that tries to explain why some countries have higher integration (more international trade) have used mainly two variables; geography and institutions and concluded in favour of the primacy of one variable over the other. Geography is used to represent the effect of climate, disease incidence, proximity to developed countries, transportation cost (access to the coast), and so forth. For example, geography is used in various studies by Sachs and Warner 1995; Sachs and Bloom 1998; Sachs *et al.* 2000; Sachs and McArthur 2001) to explain why Africa has very low income and so little trade with the rest of the world (excluding trade in minerals). The second explanation has relied on the use of institutional quality, in particular the effect of the rule of law and property rights.

The empirical evidence reported in the literature is mixed. First, research conducted by Sachs and Bloom (1998) shows the primacy of geography in explaining cross-country income differences (and integration). Then, studies by Acemoglu *et al*. (2001 and 2002) Acemoglu and Robinson (2002), Easterly and Levine (2003), Rodrik *et al*. (2002), and Dollar and Kraay (2003) show the primacy of institutions. As a response to this, Sachs (2003) comes back to show that geography, after controlling for institutions, directly affects income.

While there is a great debate on the relationship between trade policy and reforms, and income or economic growth especially concerning the direction of causality, much less research has been devoted to the question of what makes trade policy reforms fail to produce the expected positive effects in some countries.[1] More specifically, why is it that a country which is open to international trade and capital (given its import/export regulations and incentives to FDI) and which is free of the 'á-la-Sachs geography handicap', and endowed with labour surplus does not increase its integration in world markets?

The present paper contends that the answer lies in the 'institutional quality' that is predominant in the country. This proposition is subjected to empirical tests using data from Morocco, Algeria and Tunisia. It is worth noting that all three Maghreb countries have the same colonial heritage (France) and similar racial composition (Arabs and Berbers) and languages (Arabic, Berber and French). In all three countries, French is the business language. Morocco, Algeria and Tunisia all have strong economic ties with the European Union. However, Morocco is currently negotiating a free trade agreement with the United States, which makes this analysis very timely. Finally, both Morocco and Tunisia have been pursuing significant economic reforms, including trade policy reforms, since the second half of the 1980s. Thus, the contrast with the experience of Algeria should yield some interesting insights. Moreover, the type of institutions built by the French colonial administration in Morocco and Tunisia is consistent with the proposition held in Acemoglu *et al.* (2003); in the sense that colonial powers (Europeans) 'were more likely to introduce extractive institutions in regions where they

1 Stein (1994) and Aron (1997) both provide interesting discussions on institutions and economic reform in Africa. Also Williamson (1998) argues that 'privatization efforts are very much affected by contracts and governance', which constitute specific types of a country's institutions.

did not plan to settle'. However, the French had planned to settle in Algeria and, indeed, annexed the country to the *French Territoire*. According to the contention in Acemoglu *et al*., Algeria should have emerged with better institutions. The historical facts since independence in the early 1960s indicate that this was not the case. In fact, Algeria has much worse institutions than Morocco or Tunisia.

By focusing on the Maghreb region, the geography-based explanation of *underdevelopment* is no longer valid. In fact, the location of the three countries should constitute an advantage. Thus, it is a more interesting exercise to submit the second proposition (role of institutions) to analysis. The remainder of the paper is laid out as follows. In the next section we discuss reforms and institutions and their role in economic growth and development. Section 3 presents some useful insights on the role of political freedom, property rights and contract rights in ensuring the expected investment response to specific economic reforms. Section 4 describes the data and methodology employed in the empirical estimation. We analyse the econometric results in section 5. Finally, in section 6 we provide concluding comments.

2 Reforms and institutions

The fact that certain policies may not produce the expected results because of differences in institutions across countries is not surprising. Discussing institutions, North (1991: 97) states that

> [t]hey evolve incrementally, connecting the past to the present, and the future; history in consequence is largely a story of institutional evolution in which the historical performance of economies can only be understood as a part of a sequential story. Institutions provide the incentive structure of an economy; as that structure evolves, it shapes the direction of economic change towards growth, stagnation, or decline.

Economic institutions can also be viewed as 'norms of economic behaviour' (see for example Matthews 1986, and Nee and Ingram 1998). If we subscribe to this view, we need to ask whether a country's economic institutions serve as reinforcement or as a deterrent to its integration in the world economy.[2] If when conducting business, the type of institutions that exist in a country helps to lower transaction costs, then we would expect more business (see Coase 1998). This would be the case in some societies where an individual does not need collateral to borrow from his neighbour or the tribe chief for example. Individuals in this type of society would find it unattractive (or impossible) to conduct international business (trade) since the way such business is conducted is not consistent with their norms of economic behaviour. Thus, in spite of trade policy reforms, we may not see a great improvement in integration with the rest of the world economy.

There is some empirical evidence in the literature in support of the role of institutions in promoting economic growth and trade. Dollar and Kraay (2003: 160) argue that 'rapid growth in the very long run, high levels of trade and good institutions go together'. Clarke (2001) shows that institutional quality is positively correlated with R&D

2 For example, using cross sections, Mayda and Rodrik (2002) show that institutions 'play an important role in explaining the variation in preference over trade'.

expenditures. To the extent that this type of expenditures improves a country's ability to benefit from globalization, institutional quality may be crucial. Rodrik *et al.* (2002) show that the contribution of institutions to income is stronger than that of geography and trade. Similarly, Acemoglu *et al.* (2001) argue that institutional quality causes income not the other way around.

Good institutions also may help countries deal with shocks. For example, Johnson *et al.* (2000) report that 'among emerging economies open to international capital, those with weaker political and financial institutions experienced more severe crises in the late 1990s'. Thus, the interaction between shocks and institutions can be crucial. Similarly, Acemoglu *et al.* (2003) show that countries that have weak institutions (defined as lack of constraint on the executive and ineffective enforcement of property rights) tend to pursue poor macroeconomic policies.

3 Political freedom, property rights, and contract rights

Property and contract rights are crucial to the investment response that we can expect from any reform that changes relative prices in product markets (trade reform affecting the relative incentives to invest in producing exportables versus importables, for example) or which lifts restrictions on the operation of private enterprise (financial reform which reduces entry costs on establishing private banks, for example). Moreover, the extent to which property and contract rights are respected or not also affects whether entrepreneurs invest in activities which have large immediate fixed costs and long time-horizons before the profits are realized. When property and contract rights are insecure, entrepreneurs have high private discount rates, and therefore avoid investments characterized by long time-horizons and up-front fixed costs. Trade, which has low fixed costs and requires mostly working capital, therefore comes to predominate over production; merchants rather than factory owners are the wealthy class (Richards and Waterbury 1996).

One view is that the protection of political rights—civil rights, freedom of expression and so forth—can be separated from the protection of property and contract rights. Thus Barro (1996) argues that autocrats can raise living standards provided that they respect and enforce property and contract rights, thereby providing a favourable climate for private long-term investment. However, this view is challenged by Clague *et al.* (1996) who unpack the incentives facing an autocrat. A utility-maximizing autocrat who is secure in his power will have a long time-horizon and can gain from granting protection to property and contract rights. But if his time-horizon is short, then he gains more by expropriation. There are historical examples of each type of autocrat.

In contrast, a longstanding democracy will have institutions that limit individual behaviour to within the law. The system will have maintained itself because leaders, while self-interested, also want to get elected. They have incentives to comply with electoral and constitutional law and other actors, particularly in the legal system, will have incentives to ensure that politicians abide by the law. But in new democracies this web of institutions may be barely evident. An active civil society may exist (local NGOs, the church, possibly a trade union movement) but the system of formal laws governing political practice will be new, often underdeveloped and, critically, untested.

In new democracies, elected leaders face fewer constraints and it may be in their self-interest to subvert property and contract rights, either because such rights cut against their personal interests or because they can improve their prospects for re-election. So whether the leaders of a new democracy act to protect property and contract rights is critical to whether the democratic transition proves conducive or not to investment and growth. Thus Clague *et al.* (1996) conclude that:

> ... in autocracies it is the time-horizon of the *individual autocrat* (or occasionally the ruling clique) that is the main determinant of property and contract rights, whereas in democracies these rights depend on whether the *democratic system* is durable ... Any autocratic society will sooner or later come to have rulers with short time-horizons due to succession crises or other causes. We therefore hypothesize that democracies that have lasted for some time and expected to last much longer provide better property and contract rights than any other type of regime (Clague *et al*. 1996: 246, emphasis in the original).

Their empirical results confirm the hypothesis that long-lasting democracy provides better protection for property and contract rights, and is therefore better for economic development than autocracy. But their results also show that these benefits take time to appear: property and contract rights are often poor in new democracies, sometimes substantially poorer than when the countries concerned were autocracies (Clague *et al.* 1996: 271). If the arguments of Clague *et al.* (1996) are correct, then it may no longer be the case, as Barro (1996, 2000) argues that political rights and freedoms can be separated from rights to property and contract rights. It follows that economic reform is more likely to be effective in democracies than autocracies, although there will always be individual examples of autocracies where the autocrat considers limited reform to be in his personal interest.

4 Data and methodology

The methodology consists of using panel data spanning 27 years from the three Maghreb nations and assessing the effect that institutions have on the success of reforms. Our first choice of a measure of institutional quality was the index of property rights constructed by the *Heritage Foundation* (1995-2001). Property rights are believed to be superior to other proxies of institutional quality (see, for example, the work of Kaufmann *et al*., 2002 on governance and the index of institutional quality). However, this gives us a fairly small sample (21 observations). Given that we need a larger sample size (many years), we resort to the use of a composite index of political rights[3] and civil liberties. Data for this index are obtained from Freedom in the World Tables (2002) produced by Freedom House. The model also includes income and illiteracy rates to proxy for human capital. Data on per capita income ($ PPP), M2, exports, imports, GDP and adult illiteracy rates are from the World Bank—World Development Indicators CD-ROM (2002). Trade openness (trade reform) is defined as the ratio of the sum of imports and exports to GDP. Financial reform is defined as the ratio of broad money (M2) to GDP. This indicator measures financial deepening, which is often the most

3 North (1981) provides an insightful discussion of the role of political conditions in the development of efficient property rights.

important result of financial reforms.[4] In this study institutional quality is defined as the average score of civil liberties and political rights scores. This is referred to as 'non-transformed score' in Table 1b. These or similar measures have been used in the literature as indicators of institutional quality.

We believe previous studies suffer from a major weakness; they treat the variable 'institutional quality' as a crisp concept, while in reality it is fuzzy. As argued by Matthews (1986: 917), 'Because economic institutions are complex, they do not lend themselves easily to quantitative measurement ... Examples of it do exist, the literature on the economics of slavery being perhaps the most fully developed, because slavery is an institution that is sharply defined'. Thus, we are faced with institutions as a fuzzy concept that does not lend itself to modelling techniques that apply to crisp outcomes or events, but rather require the use of fuzzy sets.[5]

The concept of fuzzy sets was developed by Lotfi Zadeh (1965). Zadeh defines fuzzy sets as 'a class of objects with a continuum of grades of membership'. While the early applications of fuzzy logic were in science and engineering such as biology and artificial intelligence, fuzzy-set theory has more recently been increasingly applied to many issues in various social science and business fields.[6] Degrees of membership or compliance with goals are typically expressed by numbers belonging to the interval [0,1]. Fuzzy sets permit us to model gradual transition from membership to non-membership and vice versa. It is a concept that permits a meaningful representation of ambiguous and vague objects or outcomes. Fuzzy sets are appropriate if we want to assess the quality of institutions in a country. What is the degree of membership of a country that has *some* property right protection in the set of '*complete* property right protection'? It cannot be zero but we cannot say that the country has complete property right protection because that would amount to treating Morocco the same way we treat Canada, for example. Our analysis takes this into account. We develop a new measure of institutional quality by considering the membership of each country in the set of 'institutional quality', and derive membership degrees which we use to obtain 'scores' to be used as our indices for institutional quality.

Using the fuzzy-set technique described in Appendix A we compute *fuzzy-set transformed* scores and we use equation (3) in Appendix A to derive degrees of membership in the set of 'institutional quality' under several scenarios. In equation (3) the slope a represents the extent of vagueness. The parameter b represents the threshold at which a country changes from rather 'not free' to a rather 'free'; i.e., this parameter serves as the identification threshold. Once we obtain values for a and b (Table 1a), we proceed to compute the degree of membership (achievement) with regard to institutional quality (Table 1b). We obtain different sets of these scores based on six scenarios. To be consistent with Freedom House we consider the highest score, which is 7, as the worst outcome (i.e.; poorest institutional quality), and the lowest score, which is 1, as the best outcome.

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4 See Baliamoune and Chowdhury (2003) for a through discussion of the role of financial liberalization in promoting private saving in Morocco.

5 Also, Scully (1988) argues that there is need for 'richer measures of institutional framework'.

6 Baliamoune (2000) used fuzzy-sets to model the G-7 countries' compliance with the G-7 summit commitments. Cheli (1995) and Cheli and Lemmi (1995) applied fuzzy-set theory to the computation of poverty indicators.

Scenario 1

The degree of membership in the set of 'institutional quality' of the highest score is set to 1. One may view this as 'belonging a 100 per cent in this set', or just make the highest score a ratio to the highest possible outcome, which is 7. This yields a membership degree (μ_h) equal to 1 (or 7/7). However, for computation feasibility we change this to 0.99. The membership (μ_l) of a country with the lowest score of 1 is the ratio of 1 to 7 or 0.1428.

Scenario 2

According to Freedom House, countries with a combined average score between 1 and 2.5 are considered to be 'free'. In scenario 2 we take the average score (and lower) as the best outcome. Thus, μ_l is equal to the ratio of 1.75 to 7, or 0.25. We keep μ_h as defined in scenario 1. It is worth noting that, as shown in Table 1a, the extent of vagueness slope *a* and the identification threshold (parameter *b*) have increased (relative to their levels in scenario 1) but only very slightly.

Scenario 3

In this scenario we consider the upper boundary of the range 'free' (1.0-2.5) as the best outcome and assign it a membership μ_l equal to 0.375 (or 2.5/7). We reduce μ_h to 0.95 in order to lower the degree of vagueness.

Scenario 4

We set μ_h equal to 0.8. This implies that a country with a membership degree equal to 0.8 or higher would have experienced the worst outcome (completely not free), whereas a country with a score close to zero is considered to be perfectly free. However, because we have decreased the value of μ_l to 0.000, the extent of vagueness has increased. This would allow us to factor in a higher level of fuzziness.

Scenario 5

This scenario has the same μ_l as in scenario 3 ($\mu_l = 0.375$) but we raised μ_h to 0.99 .

Scenario 6

This scenario is a revision of scenario 4; μ_l remains the same but we have increased μ_h from 0.8 to 0.99. Note that because μ_l is extremely low, this revision has only a very small effect on the degree of vagueness.

As can be observed from the numbers associated with the six scenarios (Table 1a), it is more useful to focus on the cases that exhibit different degrees of vagueness (slope *a*) and/or identification thresholds (parameter *b*). Indeed, using scenarios 3, 4 and 5 can help us conduct a sensitivity analysis to examine whether different assumptions would lead to different conclusions. We also use the *non-transformed* scores in our empirical analysis. The numbers in Table 1b indicate that the scores can serve to reflect one's views of whether 'partly free' is an acceptable outcome. For example, under scenario 4 the index for Morocco in the late 1970s (0.03) suggests that being partly free is a great achievement. Whereas under scenario 3 the index for the same period is 0.565, implying that being partly free is not enough since the score is more than half way from zero (the index for completely free).

In order to gain an understanding of the extent of association between the variables used in the empirical estimation, we compute the relevant correlation coefficients. The correlation matrix is displayed in Table 2. It is based on the scores derived under scenario 3 but using scores from other scenarios yields similar results. The coefficients indicate that there is a positive, though not very strong, correlation between income on the one hand, and institutions, financial reforms and exports on the other. As expected, there is a very significant (-0.90) negative correlation between income and adult illiteracy. However, most other correlation coefficients are quite weak.

5 Discussion of estimation results

The empirical tests are based on fixed-effects estimations. We begin the analysis by exploring the effects of institutions, reforms and human capital on income and report the econometric results in Table 3. Four equations are estimated. Equation (1) uses non-transformed scores as a measure of institutional quality. Equations (2)-(4) use the fuzzy-based scores derived under scenarios 3, 4 and 5, respectively. Oddly, the coefficient on institutional quality is either statistically insignificant or shows up with the wrong (positive) sign; a worsening of institutions causes higher income. This result however may be explained by the fact that Algeria, which is an oil (natural gas) exporting country, enjoys a higher income while having worse institutions. Also, the time-series dimension of the model may not capture the effects of recessions and terms of trade deterioration on income. In the presence of such adverse shocks, good institutions may not be able to completely counter the negative effects on income. The indicators of financial and trade reforms have coefficients with the correct (positive) signs and are statistically highly significant in all four equations. Similarly, illiteracy has a negative effect on income and its coefficient is significant at the 1-per cent level.

Table 4 displays the results from estimating the effects of institutions and human capital on trade reforms. We also include an interactive term to capture the interaction between financial reforms and institutions. The results do not yield strong support to the influence of those variables on trade reforms, but the coefficient on the interactive term is significant in equations 3 and 4 (at the 10-per cent level) and has a negative sign. The negative sign suggests that bad institutions delay or negate the effect of financial reform and this, in turn, has adverse effects on trade reforms.

Tables 5 through 8 report econometric results from estimating the effects of institutional quality and other variables on financial reform. In Table 5 we substitute the lagged value of institutional quality for its level to try to capture the idea that sometimes institutional change precedes reform (although institutions in the Maghreb have changed very little from year to year). We also use the lagged value of income to estimate the influence of income on financial reform while trying to avoid the problem of endogeneity. The econometric results show, as expected, a positive effect of good institutions (lower score) and higher income on financial reform. All coefficients in the four equations are significant at the 1-per cent level.

The results in Table 6 indicate that good institutions have a positive influence on financial reform in all equations. It is worth noting that the coefficient on illiteracy is negative, reflecting the role of human capital in this type of reforms. Similar results are obtained from the estimation reported in Table 7, where the lagged value of institutions is used instead of the level.

Thus far, it seems that most equations yield the same conclusions. However, it is useful to explore whether there is a threshold level or a saturation effect to good institutions. Perhaps being partly free is all that a country needs. The empirical results displayed in Table 8 could help us to examine the possibility of such an idea. We keep illiteracy in the model to control for the effect of human capital and income (since illiteracy and income are highly correlated). The coefficients on institutional quality and on its square are not statistically significant in equations 1 and 4 but are highly significant in the other two equations.

We may use the results in Table 8 (equations 2-4) to solve for maxima and link them to the corresponding non-transformed (Freedom House) scores in Table 1b. If we assume that adult illiteracy does not change significantly, at least in the short run, then the maximum level is reached at the value of institutional quality (fuzzy-set transformed) equal to 0.648, 0.778, and 0.282 in equations 2, 3 and 4; respectively. A fuzzy-transformed score of 0.648 corresponds to a Freedom House combined score slightly lower than 4.0. Similarly, according to the numbers in Table 1b, the fuzzy-transformed score of 0.778 corresponds to a non-transformed score slightly higher than 4.0. Finally, a fuzzy-transformed score of 0.282 is associated with a Freedom House combined score between 4.0 and 4.5.

It is worth noting that the statistical significance of the coefficients on institutional quality in equation 4 is very weak. Thus, it is more useful to focus on the results from estimating equations 2 and 3. According to these results, as institutional quality improves, reforms are enhanced but only up to a certain point, beyond which reforms are weakened. How plausible are these results? Let us contemplate some possible explanations. First, it is quite useful to keep in mind that Freedom House (and indeed many researchers in this area) considers that countries whose combined average scores are between 3.0 and 5.5 to be 'partly free'. A score of 4.0 just happens to be very close to the middle of the range (4.25). The first possible explanation for the results from the estimation of equations 2 and 3 may reside in the nature of governance and institutions in the Maghreb. Although the region (Morocco and Tunisia in particular) have come a long way from the era of dictatorship that was predominant in the 1960s and 1970s, there is still evidence of corruption and human right abuse. Perhaps as more freedom is allowed, citizens of these countries begin to oppose reforms that they may (rightly or wrongly) perceive as benefiting the minority in power and/or in control of the country's wealth. Hence, much higher levels of civil liberties and political freedom would be associated with a set back in reforms.

Alternatively, the econometric results may reflect causality from reforms to institutional quality. More reforms enhance liberalization and the government may try to curb civil liberties and other types of freedom so that 'things do not get out of hand'. In other words, and as sad as it may sound, some governments may believe that there is a need to protect reforms from 'too many political and civil liberties'. This would be consistent with the proposition of 'getting their house in order before implementing reforms'. This does not imply that protecting reforms in this fashion will lead to their success. The experience of Morocco, in particular, suggests that without the support of the right institutions, reforms will not have the expected impact on economic growth and development.

A final explanation could be simply the short history of reforms and the relatively poor quality of institutions in the Maghreb and the time span of the data. It is possible that the

quadratic function in equations 2 and 3 becomes a cubic function in a longer time period[7] and with more improvement in the institutional quality; with a minimum in the neighbourhood of low scores (better institutions) and a maximum in the neighbourhood of 4.0. This would imply that as institutional quality improves significantly from 'partly free' to 'free', reforms become more successful. In fact, the third explanation of the empirical results in Table 4 (equations 2 and 3) is rather highly plausible, as we know that none of the three countries has ever improved its institutions beyond the 'partly free' state. Morocco has achieved the best record so far; an average combined score of 3.5 in the late 1970s, which is still within the 'partly free' range.

6 Conclusion

In this paper, we have tried to explore the role of institutions in the success of reforms in the three Maghreb countries. Two of these countries, namely Morocco and Tunisia, have embarked on significant economic reforms in the second half of the 1980s. However, they do not seem to be able to achieve the kind of take-off reached by East Asian countries. We believe that the weak institutions that are predominant in the Maghreb have hindered the success of reforms. After computing measures of institutional quality based on fuzzy-set theory, we have subjected this proposition to several empirical tests. The econometric evidence tends to lend support to our view.

Our research constitutes an important contribution to the literature in at least three respects. First, the use of fuzzy-set theory to derive an index for institutional quality is completely novel. Second, this is the first time an investigation of the effect of institutions on reforms in developing countries is conducted using panel data (Acemoglu *et al.* 2001; Rodrik *et al.* 2002; Easterly and Levine 2003, and Dollar and Kraay 2003, all use cross sectional data) which is known to be superior to cross-sectional analysis since it allows us to capture the dynamics arising from changes in trade policy and institutions. Third, by focusing on a homogenous region, such as the Maghreb, we avoid the inclusion of dummies for colonial heritage or language (since all three countries are former French colonies) and the inclusion of geography (Sachs 2003); and thus we do not need to worry about endogeneity problems and search for suitable instrumental variables (IV). This is, indeed, a common problem in most other studies.[8]

The empirical results are in support of the findings in Dollar and Kraay (2003) and show that institutions affect the outcome of trade policy reforms. Moreover, they also influence financial reforms. We may also view our conclusions as consistent with the findings in different works by Acemoglu *et al.* and Rodrik *et al*.—that institutions *do matter*. We hope that these results can be used in future research in order to gain useful insights as to why Algeria has lagged behind Morocco and Tunisia in terms of reforms and institutions. According to the proposition developed in Acemoglu *et al.* (2001), due to its particular position in France's history of colonization and as an extension of the French Territory where the French had settled, Algeria should have emerged with much better institutions.

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7 We have experimented with the cubic form using the same data but the results were not qualitatively superior to those reported in Table 8.

8 See comments in Pritchett (2003).

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Appendix A

When comparing outcomes or achievements to goals we may view the distance between the achievement and the goal as an indicator of the extent of the success in meeting the target (achievement or underachievement). If d(x) = 0, there is full membership ($\mu(x)$= 1). If $d(x) > 0$, then $\mu(x) < 1$. So that we can write μ as:

$$\mu(x) = \frac{1}{1 + d(x)} \tag{1}$$

Noting that, in general, the relationship between physical objects and perceptions takes an exponential form (see Zimmermann 1987), $d(x)$ can be expressed as:

$$d(x) = e^{-a(x-b)} \tag{2}$$

Thus,

$$\mu(x) = \frac{1}{1 + e^{-a(x-b)}} \tag{3}$$

The parameters a and b can be derived as follows. Let μ_h be the membership degree of the highest achievement (x_h) of the goal. Similarly, let μ_l be the membership degree of the lowest achievement (x_l) of the goal. From equation (3), and given μ_h and μ_l , we can solve for a and b.

$$\ln(\frac{\mu}{1-\mu}) = a(x-b) \tag{4}$$

So that

$$a = \frac{\ln(\frac{\mu_h}{1-\mu_h}) - \ln(\frac{\mu_l}{1-\mu_l})}{x_h - x_l} \tag{5}$$

and

$$b = \frac{x_l \ln(\frac{\mu_h}{1-\mu_h}) - x_h \ln(\frac{\mu_l}{1-\mu_l})}{\ln(\frac{\mu_h}{1-\mu_h}) - \ln(\frac{\mu_l}{1-\mu_l})} \tag{6}$$

Table 1a
Deriving the parameters a and b

	μ_h	μ_l	*a*	*b*
Scenario 1	0.99	0.1429	7.5393	0.3805
Scenario 2	0.99	0.2500	7.6942	0.3928
Scenario 3	0.95	0.3571	5.9580	0.4558
Scenario 4	0.8	0.0000	16.1242	0.7140
Scenario 5	0.99	0.3571	8.1897	0.4289
Scenario 6	0.99	0.0000	16.2709	0.7076

Table 1b
Institutional quality scores

	Freedom House scores			Scenario 1*			Scenario 2*			Scenario 3*			Scenario 4*			Scenario 5*			Scenario 6*		
	ALG	MOR	TUN	ALG	MOR	TUN	ALG	MOR	TUN	ALG	MOR	TUN	ALG	MOR	TUN	ALG	MOR	TUN	ALG	MOR	TUN
1972	6	4.5	5.5	0.973	0.878	0.955	0.973	0.873	0.954	0.916	0.753	0.877	0.910	0.241	0.761	0.971	0.852	0.949	0.919	0.259	0.781
1973	6	5	5.5	0.973	0.925	0.955	0.973	0.922	0.954	0.916	0.823	0.877	0.910	0.501	0.761	0.971	0.912	0.949	0.919	0.527	0.781
1974	6	5	5.5	0.973	0.925	0.955	0.973	0.922	0.954	0.916	0.823	0.877	0.910	0.501	0.761	0.971	0.912	0.949	0.919	0.527	0.781
1975	6.5	5	5.5	0.984	0.925	0.955	0.984	0.922	0.954	0.944	0.823	0.877	0.970	0.501	0.761	0.984	0.912	0.949	0.973	0.527	0.781
1976	6	5	5.5	0.973	0.925	0.955	0.973	0.922	0.954	0.916	0.823	0.877	0.910	0.501	0.761	0.971	0.912	0.949	0.919	0.527	0.781
1977	6	3.5	5.5	0.973	0.711	0.955	0.973	0.695	0.954	0.916	0.565	0.877	0.910	0.031	0.761	0.971	0.642	0.949	0.919	0.033	0.781
1978	6	3.5	5.5	0.973	0.711	0.955	0.973	0.695	0.954	0.916	0.565	0.877	0.910	0.031	0.761	0.971	0.642	0.949	0.919	0.033	0.781
1979	6	3.5	5.5	0.973	0.711	0.955	0.973	0.695	0.954	0.916	0.565	0.877	0.910	0.031	0.761	0.971	0.642	0.949	0.919	0.033	0.781
1980	6	4	5.5	0.973	0.808	0.955	0.973	0.798	0.954	0.916	0.666	0.877	0.910	0.091	0.761	0.971	0.763	0.949	0.919	0.098	0.781
1981	6	4.5	5	0.973	0.878	0.925	0.973	0.873	0.922	0.916	0.753	0.823	0.910	0.241	0.501	0.971	0.852	0.912	0.919	0.259	0.527
1982	6	4.5	5	0.973	0.878	0.925	0.973	0.873	0.922	0.916	0.753	0.823	0.910	0.241	0.501	0.971	0.852	0.912	0.919	0.259	0.527
1983	6	4.5	5	0.973	0.878	0.925	0.973	0.873	0.922	0.916	0.753	0.823	0.910	0.241	0.501	0.971	0.852	0.912	0.919	0.259	0.527
1984	6	4.5	5	0.973	0.878	0.925	0.973	0.873	0.922	0.916	0.753	0.823	0.910	0.241	0.501	0.971	0.852	0.912	0.919	0.259	0.527
1985	6	4.5	5	0.973	0.878	0.925	0.973	0.873	0.922	0.916	0.753	0.823	0.910	0.241	0.501	0.971	0.852	0.912	0.919	0.259	0.527
1986	6	4.5	5.5	0.973	0.878	0.955	0.973	0.873	0.954	0.916	0.753	0.877	0.910	0.241	0.761	0.971	0.852	0.949	0.919	0.259	0.781
1987	6	4.5	5.5	0.973	0.878	0.955	0.973	0.873	0.954	0.916	0.753	0.877	0.910	0.241	0.761	0.971	0.852	0.949	0.919	0.259	0.781
1988	5.5	4.5	5	0.955	0.878	0.925	0.954	0.873	0.922	0.877	0.753	0.823	0.761	0.241	0.501	0.949	0.852	0.912	0.781	0.259	0.527
1989	5	4.4	4	0.925	0.866	0.808	0.922	0.860	0.798	0.823	0.737	0.666	0.501	0.201	0.091	0.912	0.837	0.763	0.527	0.217	0.098
1990	4	4.4	4.5	0.808	0.866	0.878	0.798	0.860	0.873	0.666	0.737	0.753	0.091	0.201	0.241	0.763	0.837	0.852	0.098	0.217	0.259
1991	4	5.5	5	0.808	0.955	0.925	0.798	0.954	0.922	0.666	0.877	0.823	0.091	0.761	0.501	0.763	0.949	0.912	0.098	0.781	0.527
1992	6.5	6.5	5.5	0.984	0.984	0.955	0.984	0.984	0.954	0.944	0.944	0.877	0.970	0.970	0.761	0.984	0.984	0.949	0.973	0.973	0.781
1993	6.5	5	5.5	0.984	0.925	0.955	0.984	0.922	0.954	0.944	0.823	0.877	0.970	0.501	0.761	0.984	0.912	0.949	0.973	0.527	0.781
1994	7	5	5.5	0.991	0.925	0.955	0.991	0.922	0.954	0.962	0.823	0.877	0.990	0.501	0.761	0.991	0.912	0.949	0.991	0.527	0.781
1995	6	5	5.5	0.973	0.925	0.955	0.973	0.922	0.954	0.916	0.823	0.877	0.910	0.501	0.761	0.971	0.912	0.949	0.919	0.527	0.781
1996	6	5	5.5	0.973	0.925	0.955	0.973	0.922	0.954	0.916	0.823	0.877	0.910	0.501	0.761	0.971	0.912	0.949	0.919	0.527	0.781
1997	6	5	5.5	0.973	0.925	0.955	0.973	0.922	0.954	0.916	0.823	0.877	0.910	0.501	0.761	0.971	0.912	0.949	0.919	0.527	0.781
1998	5.5	4.5	5.5	0.955	0.878	0.955	0.954	0.873	0.954	0.877	0.753	0.877	0.761	0.241	0.761	0.949	0.852	0.949	0.781	0.259	0.781
1999	5.5	4.5	5.5	0.955	0.878	0.955	0.954	0.873	0.954	0.877	0.753	0.877	0.761	0.241	0.761	0.949	0.852	0.949	0.781	0.259	0.781
2000	5.5	4.5	5.5	0.955	0.878	0.955	0.954	0.873	0.954	0.877	0.753	0.877	0.761	0.241	0.761	0.949	0.852	0.949	0.781	0.259	0.781

* To compute a fuzzy-set transformed index (score) we first take the non-transformed score and divide it by the highest possible score 7. The resulting number becomes the value of *x* in equation 3 (Appendix A).

Table 2
Correlation coefficients

	Exports	Imports	Income	Institutions	M2/GDP
Imports	0.809524				
Income	0.312035	-0.1077			
Institutions	0.299493	0.010773	0.395804		
M2/GDP	-0.30666	-0.4775	0.375254	0.241785	
Illiteracy	-0.5563	-0.19503	-0.90112	-0.36911	-0.08729

Table 3
Fixed-effect model

Dependent variable: Income per capita, $ PPP (log)

	(1)[a]	(2)[a]	(3)[a]	(4)[a]
Institutional quality	0.0234	0.2506**	0.3238**	0.0640*
	(0.0147)	(0.1187)	(0.1392)	(0.0324)
Financial reform	0.0117***	0.0116***	0.0116***	0.0117***
	(0.0009)	(0.0009)	(0.0009)	(0.0009)
Illiteracy	-0.0358***	-0.0358***	-0.0359***	-0.3581***
	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Trade reform	0.0044***	0.0045***	0.0045***	0.0045***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)
Fixed effects				
Algeria	9.026***	8.945***	8.865***	9.107***
Morocco	9.075***	8.999***	8.919***	9.159***
Tunisia	8.690***	8.604***	8.519***	8.768***
No. of observations	72	72	72	72
Adjusted R^2	0.999	0.999	0.999	0.999
F-test	23406	25844	26888	24465

Notes: * indicates significance at 0.1, ** indicates significance at 0.05 and *** indicates significance at 0.01. White heteroscedasticity-consistent standard errors are in parentheses.

[a] Equation (1) uses the average scores (civil liberty and political rights) published by Freedom House without any further transformation. These are the scores in columns labelled 'Freedom House scores' in Table 1b. Equation (2) uses the fuzzy-transformed scores obtained under scenario 3. Equation (3) uses the fuzzy-transformed scores obtained under scenario 4. Equation (4) uses the fuzzy-transformed scores obtained under scenario 5.

Table 4
Fixed-effect model

Dependent variable: Trade reform

	(1)[a]	(2)[a]	(3)[a]	(4)[a]
Institutional quality	1.9435	11.0418	6.4058	17.6790*
	(1.5548)	(9.7424)	(7.4906)	(9.2269)
Institutional quality x Financial reform (interactive)[b]	-0.0332	-0.2036	-0.2068*	-0.3128*
	(0.0201)	(0.1248)	(0.1095)	(0.1646)
Illiteracy	-0.1410	-0.1527	-0.2006	-0.0477
	(0.1344)	(0.1384)	(0.1453)	(0.1052)
Fixed effects				
Algeria	60.292***	61.762***	68.886***	55.581***
Morocco	54.885***	56.294***	63.383***	49.721***
Tunisia	82.382***	83.731***	90.300***	77.675***
No. of observations	81	81	81	81
Adjusted R^2	0.801	0.802	0.820	0.804
F-test	65.59	65.99	74.02	66.65

Notes: * indicates significance at 0.1, ** indicates significance at 0.05 and *** indicates significance at 0.01. White heteroscedasticity-consistent standard errors are in parentheses.

[a] Equation (1) uses the average scores (civil liberty and political rights) published by Freedom House without any further transformation. These are the scores in columns labelled 'Freedom House scores' in Table 1b. Equation (2) uses the fuzzy-transformed scores obtained under scenario 3. Equation (3) uses the fuzzy-transformed scores obtained under scenario 4. Equation (4) uses the fuzzy-transformed scores obtained under scenario 5.

[b] This term is added in order to capture the interaction between institutional quality and reforms.

Table 5
Fixed-effect model

Dependent variable: Financial reform

	(1)[a]	(2)[a]	(3)[a]	(4)[a]
Institutional quality$_{(t-1)}$	-2.4940***	-17.4477***	-17.2603***	-5.5784***
	(0.4736)	(3.5340)	(4.3595)	(0.8643)
Income$_{(t-1)}$	9.9630***	9.9738***	8.6367***	9.9318***
	(0.3618)	(0.3646)	(0.3078)	(0.3531)
Fixed effects				
Algeria	-11.439***	-10.539***	1.311***	-21.195***
Morocco	-18.282***	-16.649***	-3.475***	-27.700***
Tunisia	-24.607***	-23.001***	-10.446***	-33.907***
No. of observations	72	72	72	72
Adjusted R^2	0.979	0.979	0.980	0.978
F-test	843.49	841.37	890.81	858.76

Notes: * indicates significance at 0.1, ** indicates significance at 0.05 and *** indicates significance at 0.01. White heteroscedasticity-consistent standard errors are in parentheses.

[a] Equation (1) uses the average scores (civil liberty and political rights) published by Freedom House without any further transformation. These are the scores in columns labelled 'Freedom House scores' in Table 1b. Equation (2) uses the fuzzy-transformed scores obtained under scenario 3. Equation (3) uses the fuzzy-transformed scores obtained under scenario 4. Equation (4) uses the fuzzy-transformed scores obtained under scenario 5.

Table 6
Fixed-effect model

Dependent variable: Financial reform

	(1)[a]	(2)[a]	(3)[a]	(4)[a]
Institutional quality	-3.5995***	-27.3342***	-30.534***	-7.822***
	(0.4246)	(3.0328)	(3.9751)	(0.7053)
Illiteracy	-0.3942***	-0.3945***	-0.3964***	-0.3936***
	(0.0094)	(0.0094)	(0.0098)	(0.0093)
Fixed effects				
Algeria	97.474***	100.851***	105.580***	82.822***
Morocco	88.942***	93.108***	98.420***	74.871***
Tunisia	79.797***	84.068***	89.268***	65.848***
No. of observations	81	81	81	81
Adjusted R^2	0.987	0.989	0.988	0.988
F-test	1644.47	1673.03	1609.49	1640.58

Notes: * indicates significance at 0.1, ** indicates significance at 0.05 and *** indicates significance at 0.01. White heteroscedasticity-consistent standard errors are in parentheses.

[a] Equation (1) uses the average scores (civil liberty and political rights) published by Freedom House without any further transformation. These are the scores in columns labelled 'Freedom House scores' in Table 1b. Equation (2) uses the fuzzy-transformed scores obtained under scenario 3. Equation (3) uses the fuzzy-transformed scores obtained under scenario 4. Equation (4) uses the fuzzy-transformed scores obtained under scenario 5.

Table 7
Fixed-effect model

Dependent variable: Financial reform

	(1)[a]	(2)[a]	(3)[a]	(4)[a]
Institutional quality$_{(t-1)}$	-3.0701***	-22.3841***	-24.069***	-6.8265***
	(0.3936)	(3.0300)	(5.0785)	(0.6720)
Illiteracy	-0.4090***	-0.4096***	-0.4113***	-0.4084***
	(0.0108)	(0.0110)	(0.00114)	(0.0105)
Fixed effects				
Algeria	95.382***	97.477***	100.480***	83.034***
Morocco	87.018***	89.897***	93.465***	75.059***
Tunisia	77.712***	80.581***	83.973***	65.916***
No. of observations	84	84	84	84
Adjusted R^2	0.984	0.983	0.983	0.984
F-test	1282.71	1275.67	1227.61	1640.58

Notes: * indicates significance at 0.1, ** indicates significance at 0.05 and *** indicates significance at 0.01. White heteroscedasticity-consistent standard errors are in parentheses.

[a] Equation (1) uses the average scores (civil liberty and political rights) published by Freedom House without any further transformation. These are the scores in columns labelled 'Freedom House scores' in Table 1b. Equation (2) uses the fuzzy-transformed scores obtained under scenario 3. Equation (3) uses the fuzzy-transformed scores obtained under scenario 4. Equation (4) uses the fuzzy-transformed scores obtained under scenario 5.

Table 8
Fixed-effect model

Dependent variable: Financial reform

	(1)[a]	(2)[a]	(3)[a]	(4)[a]
Institutional quality	-0.5862	125.0418**	285.9185***	5.0316
	(10.498)	(60.356)	(58.896)	(10.1007)
(Institutional quality)^2	-0.3033	-96.4918**	-183.8090***	-8.9105
	(1.0767)	(38.2578	(34.0665)	(9.9292)
Illiteracy	-0.3945***	-0.3939***	-0.3922***	-0.4208***
	(0.0096)	(0.0095)	(0.0092)	(0.0319)
Fixed effects				
Algeria	95.382***	42.223***	-28.682***	80.220***
Morocco	87.018***	33.723***	-36.687***	73.748***
Tunisia	77.712***	24.464***	-45.999***	62.8671***
No. of observations	81	81	81	81
Adjusted R^2	0.988	0.987	0.988	0.936
F-test	1277.51	1265.27	1312.54	1640.58

Notes: * indicates significance at 0.1, ** indicates significance at 0.05 and *** indicates significance at 0.01. White heteroscedasticity-consistent standard errors are in parentheses.

[a] Equation (1) uses the average scores (civil liberty and political rights) published by Freedom House without any further transformation. These are the scores in columns labelled 'Freedom House scores' in Table 1b. Equation (2) uses the fuzzy-transformed scores obtained under scenario 3. Equation (3) uses the fuzzy-transformed scores obtained under scenario 4. Equation (4) uses the fuzzy-transformed scores obtained under scenario 5.