EDUCATION, NEOPATRIMONIALISM AND REVOLUTIONS

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Education, neopatrimonialism, and revolutions[*]

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Abstract

The occurrence of some revolutionary episodes seems initially puzzling. For example, before the 'Arab Spring', macroeconomic conditions were improving, the political leaders had been in power for a long time, and the autocrats had shown an apparent interest in the welfare of their population by investing in human capital. We argue that such a paradox can be solved by considering that high education levels are incompatible with the features characterising strong neopatrimonial states. We develop this intuition in a simple theoretical model and we test our prediction in a sequential empirical study of regime changes and regime breakdowns in a large panel of countries. We indeed find that a regime change is more likely in countries combining high neopatrimonialism and high education levels. Moreover, when a regime change happens under these circumstances, a revolution is the most likely type of regime breakdown. These results help to understand the 'Arab Spring' but are not specific to the Arab world.

JEL: D74, P16; **Keywords:** education, neopatrimonialism, regime breakdown, regime change, revolution.

1 Introduction

The relationship between educational attainment and democracy is hotly debated in the economic literature. Proponents of the modernisation theory, inspired by Lipset (1959) believe that more education leads to the emergence of democracy. However, cross-countries econometric studies have not reached a consensus. Acemoglu et al. (2005) argue that prominent studies which have found a positive impact of education on democracy (Barro, 1999; Glaeser et al., 2007) have failed to control for unobserved country and time heterogeneity. The debate is still on-going (Alemán and Kim, 2015) but may be missing a broader and more interesting question, that is how the interaction between growing educational attainment and the existing political regime can be conducive to a regime breakdown, not necessarily associated with subsequent democratisation.

The most recent and emblematic example is the 2011 'Arab Spring'. The popular uprisings in Middle East and North Africa (MENA) countries led to the fall of long-lasting autocratic regimes but not to the widespread emergence of democracy. Population in most of these countries was highly educated. It is then possible that the MENA revolutions[1] were the outcome of a growing irreconcilable tension between the autonomous values nurtured by education and the coercive and unfair principles of authoritative regimes exhibiting high levels of presidentialism, clientelism, and corruption, i.e. strong neopatrimonialism (Eisenstadt, 1973; Bratton and Van de Walle, 1997). Neopatrimonialism is not simply the lack of democratic elections but the appropriation of most of the political and resources of the state by the political leader.

This paper is precisely devoted to investigating whether a revolution is more likely to occur in neopatrimonial countries when their population becomes increasingly educated. A preliminary question that may arise is why neopatrimonial regimes would favour mass education. This policy would seem extremely myopic, notably because, according to the view associated with Lipset (1959), education is an essential driver of a modernisation/development process which ultimately leads to the fall of autocracies and subsequent democratisation. This is the story told in Glaeser et al. (2007) and more recently in Boucekkine et al. (2019). From a 'Lipsetian' perspective, educated people are open-minded flexible individuals, prone to negotiation and eager to reach compromises. Accordingly, regime change may occur through a peaceful handover of power by the elite. However, as pointed out by Albrecht and Schlumberger (2004), truly neopatrimonial autocrats hardly do so.

In fact, in many historical and political contexts, education has not been used to give birth to new generations of free sprits, but was primarily implemented within a political agenda. This was already clear in the mass education major reforms during the 19th century Industrial Revolution; see for example Galor and Moav (2006)

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[1] We use in an interchangeable manner 'revolution' and 'popular uprising'.

on the 1871 Forster Act in the United Kingdom. In such a historical episode, mass education was imposed by capitalists to meet the demand for skilled labor of the growing industrial sectors.[2] The same logic has been under way in many neopatrimonial countries: education was seen as a means to achieve political and/or economic goals, not as a tool for social or political liberalisation paving the way to a democratic take-off. The case of Algeria's post-independence heavy industrialisation program exemplifies this process (Benziane, 2004). It was only one of the many modernisation programs initiated by African leaders after independence, such as those of the Ghanian and Tanzanian historical leaders, Nkrumah and Nyerere (see Opoku and Yan, 2019).

Many neopatrimonial countries have thus invested in education because their leaders gained from greater human capital-driven production. Nevertheless, it would be wrong to assume that mass education in the newly independent African countries happened only to support the industrialisation efforts. One should recall that the French coloniser left Algeria with a gross primary enrolment rate of around 17% in 1962 (see Kateb, 2004). Similar dismal schooling performance characterised the majority of African and Arab countries at independence.[3] Consequently, the 'manipulation' perspective lacks relevance for the early (60s-70s) rise of education in these countries. These were rather special times where the vast majority of citizens did adhere to the policies implemented by the new rulers, in particular when they were explicitly trying to offset the heritage of colonisation.

In this paper we first develop a simple stylised theoretical model explaining the link between neopatrimonialism, rising education, and popular uprisings against autocrats. In line with Zaller (1992), more educated citizens become more aware of the 'unfair' (in political and economic terms) institutions governing them and revolt if their dissatisfaction with this situation is acute enough. Higher educational attainment also lowers the coordination and economic costs of mass revolt, by contributing for instance to the creation of a student network or lower physical destruction (Boucekkine et al., 2016; Chenoweth and Ulfelder, 2017). In parallel, we link the degree of neopatrimonialism to the imperfect internalisation by the autocrats of the above described Zaller effect. Optimal education then increases in the degree of neopatrimonialism because autocrats gain from more human capital-driven production. Our model shows that the voluntary mass education in neopatrimonial states ultimately leads to popular uprisings. It can also explain why some neopatrimonial regimes favour mass education, despite the risk of sowing the seeds of their own destruction.

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[2]This view is rather consistent with Noam Chomsky's, one of the major theorists of mass manipulation. Recalling the history of education in the United States, he argues: "... And these were independent farmers...And they had to be driven into factories and turned into tools for someone else. There's a lot of resistance to it. So a lot of public education was, in fact, concerned with trying to teach independent people to become workers in an industrial system" (https://chomsky.info/20130601/.)

[3]It has been argued that the British coloniser was more supportive of long-term development goals than the other European colonizers (see for example, Bertocchi and Canova, 2002), including education. This view has been strongly challenged by (Frankema, 2012) for British Africa.

We then perform an empirical analysis, using a sequential logit model. We distinguish between the determinants of regime change and those of the type of regime breakdown triggering the regime change. In line with our theoretical model, we find that the probability of a regime change is higher in countries characterised by both high neopatrimonialism and high education levels. Moreover, when a regime change happens under these circumstances, a popular uprising is the most likely form of regime breakdown.

While our sample covers all countries in the world over the period 1950-2017, our results are inherently informative to understand the political events which have shaken the Arab world in the last decade (including the ongoing Algerian crisis). In 2011, most of the Middle East and North Africa (MENA) countries had recently experienced declines in relative poverty and expenditure inequality as well as improvements in a number of Millennium Development Goals (Lanchovichina, 2017). Early warning indicators, such as the Failed States Index, suggested that MENA countries were, on average, stable countries with a positive outlook (Goodwin, 2011). Given these apparently good fundamentals, the 'Arab Spring' uprisings caught the world by surprise. While there is now a quite abundant literature on this topic (see chapter 4 of Grinin et al., 2018 for a survey), a key contribution of this paper is to propose a new appraisal of the Arab spring events rooted in the contradiction highlighted above between (modern) education and neopatrimonialism. Campante and Chor (2012, 2014) have also singled out education as a determinant of the 2011 Arab spring events. Nevertheless, we depart from their key finding according to which it is the conjunction of educational attainment with the worsening of economic conditions which has ultimately led to the popular uprisings. Instead, our results suggest that structural neopatrimonialism, despite its limited abilities to adapt (Albrecht and Schlumberger, 2004), became increasingly incompatible with the growing intolerance for this type of regime generated by higher education levels. From this perspective, we are closer to Devarajan and Ianchovichina (2017) and Arampatzi et al. (2018) who have stressed the increasing dissatisfaction in the Arab world with access to public services, corruption and social and economic justice. Although they do not put forward the role of education, they have identified several features of neopatrimonialism as crucial drivers of the protests and the subsequent regime changes.

The paper is organised as follows. Section 2 presents some stylised facts on neopatrimonialism, education, and welfare indicators, with a focus on the MENA region. Section 3 proposes a simple theoretical model highlighting our key hypothesis. Section 4 presents our empirical model and the data used. Section 5 presents and discusses our empirical results. Section 6 concludes.

2 Stylised facts

We provide in this Section a series of stylised facts which motivate our intuition on the determinants of revolutions. Given the recent events in the MENA region, we focus on this geographic zone. We also introduce some of the key variables that we will use in our econometric analysis.

SF1: Strong neopatrimonialism in MENA

The neopatrimonial rule index comes from the V-Dem (Varieties of Democracy) database.[4] It attempts to capture, on the basis of sixteen indicators, the combination of the three concepts which define together a neopatrimonial regime: (i) politics based on clientelism relationships (clientelism); (ii) unconstrained concentration of political power in the hands of the executive (presidentialism); (iii) use of the political office by political actors for private or political gain (regime corruption). It ranges from 0 to 1 (no to very high neopatrimonial rule). Figure 1 highlights that strong neopatrimonialism was initially common in all (mostly developing) regions. However, since the early nineties, it has globally declined, although at a much slower and erratic pace in the MENA region.

Figure 1: Changes in neopatrimonialism over time, by region
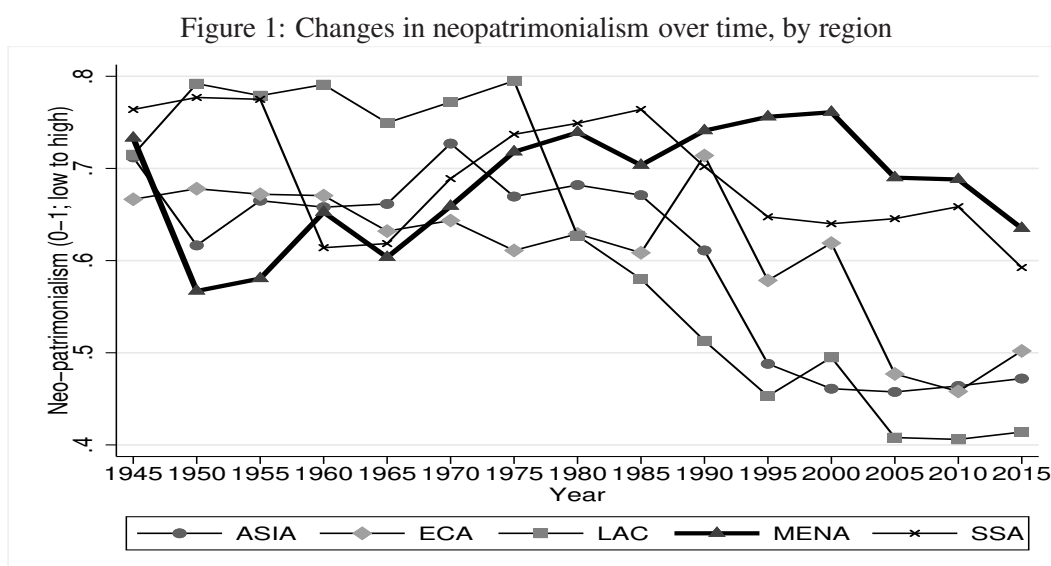
Notes: Median values. Data come from V-Dem. ASIA: South and East Asia and Pacific. ECA: Eastern Europe and Central Asia. LAC: Latin America and the Caribbean. MENA: Middle East and North Africa. SSA: Sub-Saharan Africa. Western Europe and neo-Europes not reported.

In this paper, we make a specific reference to neopatrimonialism and not autocracy. The reason is that neopatrimonialism is not simply the absence of electoral democracy. It involves very personalistic forms of authority which are likely to seem unacceptable to educated people. Figure 2 shows that the absence (presence)

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[4]https://www.V-Dem.net/

of an electoral democracy elections (measured by the widely used Polity score[5]) does not necessarily imply a strong (weak) neopatrimonial state and vice-versa (e.g. Singapore vs. Nicaragua).

Figure 2: Neopatrimonialism vs lack of electoral democracy (2010)
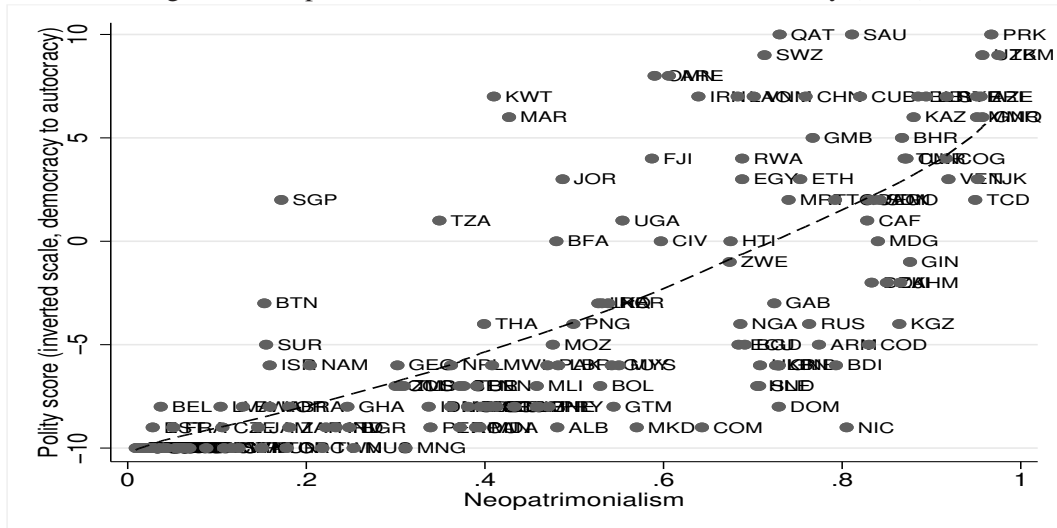
Notes: Data come from V-Dem and the Polity IV Project. The dashed line is the locally weighted ('lowess') regression line.

SF2: High level on education in MENA

Data on the mean number of years spent in school in the population aged 15 and over come from the Wittgenstein Centre.[6] In comparison to the widely used Barro and Lee's dataset, this database provides a wider country coverage and, possibly, methodological improvements. Figure 3 shows that educational attainment has increased worldwide, with a remarkable improvement in the MENA region in the last sixty years. It is now one of the most educated regions in the world.

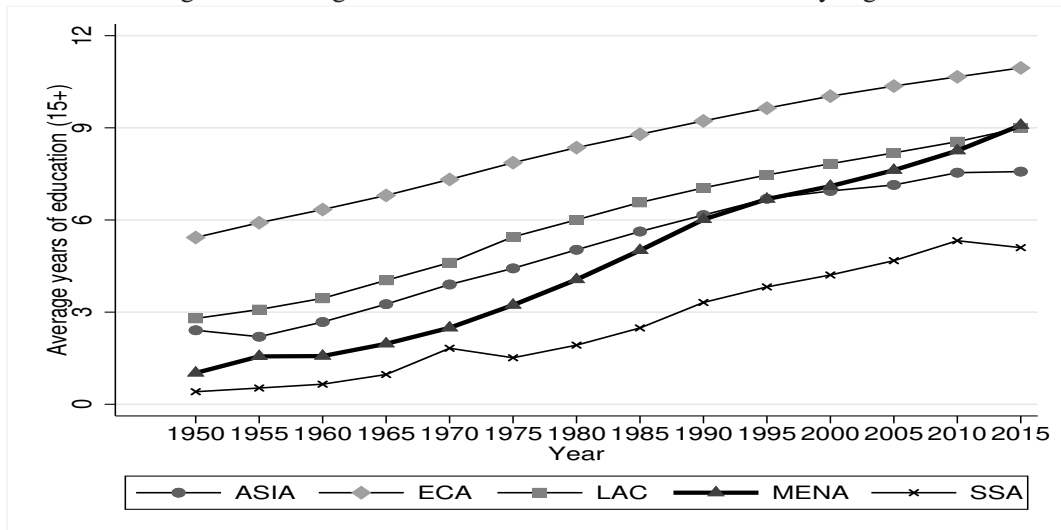*SF3: Overall monetary welfare improvements within MENA*

The World Bank PovcalNet database provides access to nationally representative household surveys for some countries in the MENA region, using consumption in 2005 US$ PPP as the welfare measure.[7] Based on these surveys, median monthly consumption and inequality of consumption expenditures can be calculated. Figure 4 indicates that median consumption increased in all countries while inequality remained stable or decreased between the years 1995 and 2010.

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[5]https://www.systemicpeace.org/polityproject.html
[6]http://dataexplorer.wittgensteincentre.org/wcde-v2/
[7]http://iresearch.worldbank.org/PovcalNet/

Figure 3: Changes in educational attainment over time, by region

Notes: Median values. Data come from the Wittgenstein Centre. ASIA: South and East Asia and Pacific. ECA: Eastern Europe and Central Asia. LAC: Latin America and the Caribbean. MENA: Middle East and North Africa. SSA: Sub-Saharan Africa. Western Europe and neo-Europes not reported.

We know that Egypt (EGY) and Tunisia (EGY) and later Algeria (DZA) experienced a popular uprising. On the other hand, Jordan (JOR) and Morocco (MAR) did not. The latter are not those countries which have the highest consumption levels, experienced the fastest economic growth, or the strongest decline in economic inequality. This suggests that the Arab Spring has not been triggered by weak economic conditions.

Figure 4: Monetary welfare in selected MENA countries
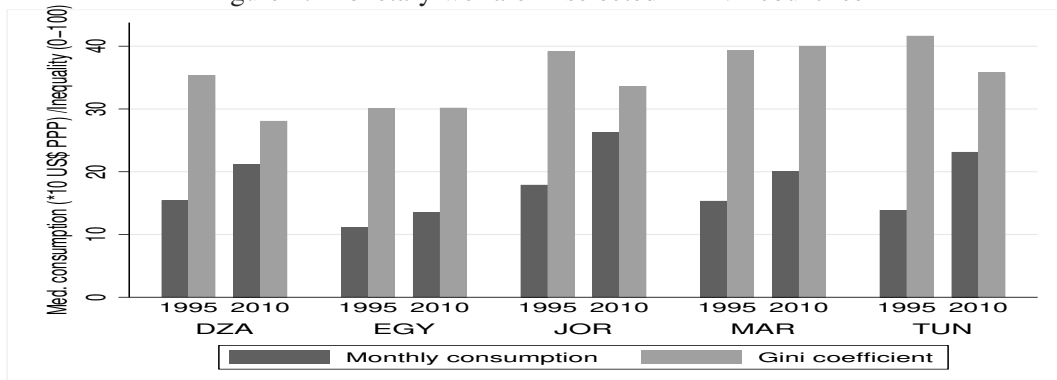
Notes: Data come from the World Bank PovcalNet database. Values have been interpolated to obtain overlapping years.

SF4: Revolutions happened within MENA when the combination of neopatrimonialism and education was high

We have seen that the MENA region is, overall, characterised by both high neopatrimonialism and high education. However, within this region, countries diverge in their combination of these two attributes. Figure

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5 indicates that all countries experienced higher education. On the other hand, neopatrimonialism fell, from relatively low levels, in some countries (Jordan and Morocco) whereas it remained stable at high levels or increased from high levels in Algeria, Egypt, and Tunisia.

Figure 5 also reports the interaction between neopatrimonialism and education. It can be noticed that popular uprising occurred in those countries characterised with high values for this interaction in 2010.

Figure 5: Neopatrimonialism and education in selected MENA countries
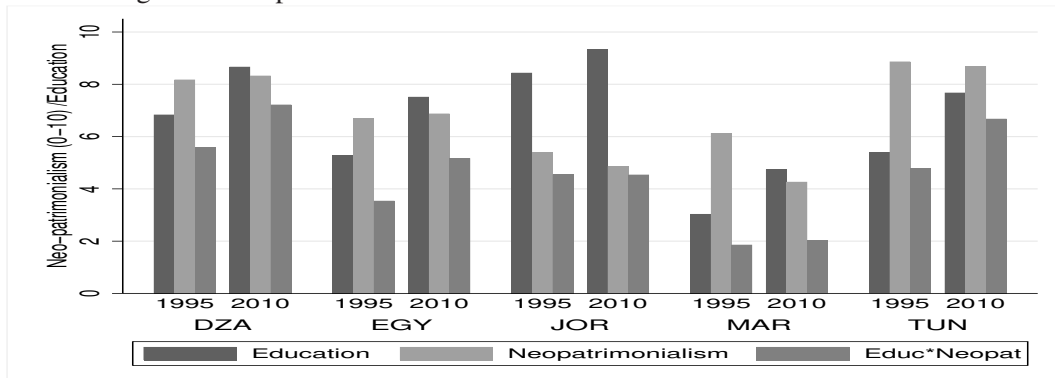
Notes: Data come from V-Dem and the Wittgenstein Centre. The values of the interaction term are divided by 10.

Overall, these stylised facts suggest that revolutions may be triggered by a combination of strong neopatrimonialism and high education levels. We develop this intuition in a simple theoretical model.

3 A simple model of revolution with education and neopatrimonialism

3.1 The basic framework

We consider a static model of an economy in which two groups exist, the *elite* and the *citizens*, with the size of the latter group always larger than the former. It is a one-good economy. The economy starts with a given endowment of the good, say with initial resources $w > 0$. We assume that the elite owns all the resources initially. The regime is non-democratic in the sense that citizens are excluded from the *de jure* power. All the relevant economic and political decisions, such as wage determination, redistribution and taxation, are taken by the elite.

To focus on the essential trade-off faced by the elite when deciding about investment in education, we adopt a very simple one-sector model, in contrast to Boucekkine et al. (2019) who study a two-sector model with a differentiated education and final good sector. The unique production input is human capital, h. There is a

one to one costless transformation of resources into human capital. The unused fraction of resources is lost.[8] In other words, education is essential in the production of the final good. By taking this approach, we have in mind neopatrimonial countries with dominant human-capital intensive productive activities, that is with sizeable industry and services sectors. This is clearly the case in the vast majority of MENA countries. Obviously, our modelling is not adapted for overly rural/extractive countries like Democratic Republic of Congo. At the same time, there is no point in modelling such economies which do not fall in the set of countries with high educational attainments. If there is no political will to develop human capital-intensive sectors, there is no rationale to invest in education, and that is precisely what occurred in Mobutu's DRC.

Here, we assume that such a political will exists as we leave no option to produce wealth and welfare outside human-capital intensive activities. We will comment more extensively on this assumption in the next subsection. Here, we close the description of our basic framework by a simple technological assumption

Assumption 1. *The production function of the economy, $F(h)$, $0 \leq h \leq w$, verifies: $F(0) = 0$, $F'(h) > 0$, and $F''(h) < 0$.*

These are typical neoclassical assumptions. Strict concavity of the production function is needed for the optimisation problems treated below to make easy sense.

The timing of the events is as follows: first, the elite decides about the optimal size of human capital as well as the share of the final production, that is the share of wealth produced, to be assigned to citizens. Depending on these choices, the citizens might undertake collective actions, such as protests and rebellions, against the elite.

3.2 Neopatrimonialism, redistribution and education

As just mentioned above, the elite has to fix the educational effort as well as the share of wealth to be accrued to citizens. Call $\mu(h)$ this share. Note that it depends on the level of human capital. This is related to our point in the Introduction about the awareness mechanism à la Zaller (1992). The elite (possibly imperfectly) internalises the fact that a higher level of education is also conducive to a more demanding population. Thus, the elite faces an essential trade-off: education is wealth-enhancing but also means a lower share of GDP. A similar mechanism is considered in Boucekkine et al. (2019) within a two-sector framework à la Lucas-Uzawa where the final good sector is perfectly competitive. Citizens receive competitive wages (remunerating human

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[8]We have also tried alternative one-sector models with both physical and human capital along the lines of Barro and Sala-i Martin (1998), chapter 5. Such extensions are more complicated algebraically and do not deliver different qualitative results. Our simpler model allows us to illustrate much more clearly and directly the essential trade-off involved in the elite's education decision.

capital) and transfers indexed on human capital to reflect Zaller's awareness. Here we take a short-cut with our one-sector model and the single 'redistribution' variable $\mu(h)$, embedding both direct remuneration to human capital and transfers.

We need not assume that the final good sector is competitive; the elite can depart from the marginal productivity-based remuneration of human capital, which is very often the case in the class of countries we are interested in. Neopatrimonialism is an institutional environment in which, by definition, the ruler may fix wages following particularistic considerations which often have nothing to do with marginal productivity. This is clear in Arab countries. This is neatly documented, among others, by Assaad (2014), who highlights "the use of labour markets by Arab regimes as tool of political appeasement in the context of 'authoritarian bargain' social contracts". So, we do not assume any direct link between wages and productivity. Rather, we leave wages in the black box of the "social contract" proposed by the elite, formalized here by our share, $\mu(h)$. Indeed, we assume the following:

Assumption 2. *The redistribution rate $\mu(h)$ is such that $0 \leq \mu(h) \leq 1$, $\mu(0) = c > 0$, and $\mu'(h) > 0$.*

Notice a few interesting features. First of all, we keep the Zaller's mechanism in the sense that the share $\mu(h)$ accruing to population is increasing in human capital. Moreover, one can easily guess how the level of neopatrimonialism can be measured. One simple marginalist evaluation of the latter is the derivative $\mu'(h)$: for given h, a larger $\mu'(h)$ goes with a larger remuneration of human capital, which reinforces the Zaller mechanism and lowers the predatory neopatrimonial traits of the elite. In a working linear example, we shall parametrise the share in such a way that the degree of neopatrimonialism will show up immediately. Second, we assume that some minimal redistribution is ensured. This is a classical and sensible assumption: the share rate has two components, one indexed on the educational level and another autonomous. In the extreme case where only the latter component remains, the Zaller effect is nullified and neopatrimonialism is maximal.

We can now pose the optimisation problem of the elite:

$$
\begin{cases}
\max_h \Psi(h) = (1 - \mu(h))F(h) \\
s.t. \ \ 0 \leq h \leq w, \ \ c \leq \mu(h) \leq 1.
\end{cases}
\tag{1}
$$

The first-order condition, $\partial \Psi(h)/\partial h = 0$, allows us to derive the optimal solution of the problem of the elite, namely h^*. The first-order condition for an interior maximum for the problem of the elite, $\partial \Psi(h)/\partial h = 0$, can be written as:

$$
(1 - \mu(h))F'(h) = \mu'(h)F(h).
\tag{2}
$$

This illustrates readily the trade-off at work: the left-hand side gives the marginal benefit for the elite of marginally increasing education, which should be equal at the optimum to the marginal cost incurred by the elite, the right-hand side of the equation above, through an increasing share of GDP given to population (Zaller effect). The second-order conditions are also informative:

$$\frac{\partial^2 \Psi(h)}{\partial h^2} = -\mu''(h)F(h) - 2\mu'(h)F'(h) + (1 - \mu(h))F''(h).$$

Clearly, the sufficient second-order conditions are immediately met under Assumptions 1 and 2 provided the share rate is convex in h (that is $\mu''(h) \geq 0$).[9] It's then straightforward to fully characterise the existence and uniqueness of an optimal education decision, h^* (leading in turn to an optimal share rate $\mu(h^*)$ from the elite's point of view). This is done in the next proposition.

Proposition 1. *Under Assumptions 1 and 2 and provided the share function is convex and non-constant, the elite problem has a unique solution $0 < h^* < w$ provided*

$$\mu(w) \leq 1, \quad (1 - \mu(w))F'(w) < \mu'(w)F(w).$$

The proof is straightforward. It is enough to notice that the left-hand side of the first-order condition (2) is strictly decreasing from $(1 - c)F'(0) > 0$ to $(1 - \mu(w))F'(w)$ while the right-hand side is strictly increasing from 0 to $\mu'(w)F(w)$. The condition $(1 - \mu(w))F'(w) < \mu'(w)F(w)$ ensures that there is a unique solution comprised between 0 and w. The condition $\mu(w) \leq 1$ is a normalisation assumption. Last but not least, notice that if the share function were identically equally to a constant, then there is no interior solution: $h^* = w$, as this would mean that the Zaller effect is nullified.

For the sake of more economic insight, we will consider throughout the following functional form for the share function:

$$\mu(h) = c + (1 - \beta)h \tag{3}$$

with $\beta \in [0, 1]$. This function meets the conditions of Proposition 1. It allows for a direct visualisation of the economic ingredients of our theory. Indeed parameter β may be interpreted as the *degree of neopatrimonial-ism*. As argued above in this section, a neopatrimonial regime is characterised, among others, by a predatory behaviour and by clientelism, i.e. the use of public resources for political legitimation and private use. We therefore suppose that the larger the degree of neopatrimonialism, β, the lower the share of redistribution to

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[9]The second-order conditions may still hold for non-convex share functions but this would require finer specifications for both the share and production functions.

citizens. Note also that the linear specification of the share function is a way to model directly the notion of imperfect internalisation of the Zaller mechanism alluded in the Introduction: The larger β, the lower the weight assigned by the elite to this mechanism. Even more importantly, this linear case allows to illustrate easily the relationship between the degree of neopatrimonialism, β, and educational effort.

Corollary 1. *Under the assumptions of Proposition 1, the optimal level of the education effort, h^* is increasing in the degree of neopatrimonialism, β. Moreover, $h^* = w$ (corner solution) when neopatrimonialism is maximal ($\beta = 1$).*

The proof is again straightforward through a direct application of the implicit function theorem to the first-order condition. One ultimately gets:

$$\frac{\partial h^*}{\partial \beta} = \frac{-h^* F'(h^*) - F(h^*)}{\left(1 - c - (1 - \beta)h^*\right)F''(h^*) - 2(1 - \beta)F'(h^*)} > 0.$$

When $\beta = 1$, the share rate is independent of h, therefore the production motive of investment in human capital is not balanced by the Zaller effect, and the elite choose maximal education. This might seem paradoxical. It is not for many reasons. One is empirical: as outlined in Section 2 in the case of Arab countries, neopatrimonialism goes together with sizeable education investments. Our simple model can replicate easily this fact: in the linear share function case, as neopatrimonialism rises, the Zaller effect in less and less internalised by the elite, leading to more (mass) education.[10] Second, there are some conceptual reasons to believe that the relationship uncovered between neopatrimonialism and education is deeper. A very interesting related debate is the role of education in the political agenda of the neopatrimonial elite. We mentioned in the introduction the political will behind the industrialisation policies carried out after independence.

We now move to the final step of the game. How would citizens react to the social contract package (education, redistribution)? We show that the mechanism depicted above linking neopatrimonialism and education, via an imperfectly internalised Zaller effect, can lead to popular uprisings.

3.3 Revolutions

In a world in which the elite have the *de jure* power, citizens can protest against the policy chosen with collective actions like anti-system protests or popular revolutions. In this section, we focus on the role of neopatrimonialism and education in the launch of this type of collective actions. We do not push the analysis any further,

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[10]Recall that our modelling discards overly extractive/rural economies like Mobutu's DRC in which case there is no rationale for the elite to invest in education.

and in particular, we do not investigate whether these popular uprisings and rebellions against the elite would necessarily generate a regime change.[11]

We normalise total citizens' population to one, so we can concentrate on the pay-off of the representative citizen. The assumption on timing is crucial: citizens know the share rate $\mu(h^*)$ when choosing whether they undertake collective actions or not (note that this is the only choice they can make in this elementary setting). We define the indirect utility functions of citizens when revolting (R) or not (NR), respectively (for notational simplification, we will denote h^* simply as h, we shall differentiate if necessary):

$$V_R(h) = \rho(h)F(h) \tag{4}$$

$$V_{NR}(h) = \mu(h)F(h) \tag{5}$$

where $\rho(h) \in [0, 1]$ is the share of output that is obtained in the case of a popular uprising. The function $\rho(h)$ can be directly related to the cost of collective actions in terms of the final good, as for instance the share of the final good produced that is not destroyed by a violent uprising (in such a case the cost of revolution is given by $1 - \rho(h)$). Similarly to the share rate $\mu(h)$ above, we assume the following:

Assumption 3. *The function $\rho(h)$ is such that $\rho(0) = 0$, and $\rho'(h) > 0$.*

Assumption 3 implies that the larger the level of education of the population, i.e. the level of human capital, the lower the cost of the popular uprising or the smaller the share of destroyed resources by the revolution. It has often been argued that a more educated population is more likely to adopt non-violent methods of protest Chenoweth and Ulfelder (2017). A different argument inspired by Acemoglu et al. (2005) is that revolutions involve a coordination problem. One might think that education does lower the coordination costs of mass revolts, as argued in Boucekkine et al. (2016).

The decision of citizens in our setting is driven by the same trade-off emphasised by Acemoglu et al. (2005) and Boucekkine et al. (2016). The citizens will revolt if and only if $V_{NR}(h) < V_R(h)$. Given the forms of the indirect utilities given above, they do so if and only if $\mu(h) < \rho(h)$. This is a quite standard condition in the literature of institutional change opened up by Acemoglu and Robinson (2006): citizens will revolt provided the cost of revolution ($1 - \rho(h)$) is lower compared to inequality faced (here captured by $1 - \mu(h)$, the share of GDP accruing to the elite).

It is now possible to derive some useful insight into the revolt conditions in our framework, in particular

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[11]Of course, popular uprisings and protests are important signals of the probability of a regime change. Still, the guarantee of success is not sure, because the elites may try to stop the protest with repression or larger redistribution. In other words, in this section we do not look at the post-revolution game when popular uprisings take place.

into the role of neopatrimonialism. We use from now the linear specification of $\mu(h)$ adopted in the previous subsection. Notice at first that for any given h (not necessarily equal to h^*), the revolution condition $\mu(h) < \rho(h)$ is equivalent to:

$$\beta > 1 - \frac{\rho(h) - c}{h}.$$

It is then possible to state the following intermediate result:

Proposition 2. *Under Assumption 3, a rising level of human capital h requires a lower degree of neopatrimonialism, β, for citizens to revolt if the cost of revolutions is strictly concave in h (or equivalently if $\rho(h)$ is convex in h). The reverse occurs if the cost of revolutions is strictly convex in h, and c is small enough.*

The proof is straightforward. When $\rho(h)$ is strictly convex, the function $\frac{\rho(h)-c}{h}$ is increasing in h (because $\rho'(h)h > \rho(h)$). This means that as h goes up, the revolution condition is easier to be checked: it requires lower degrees of neopatrimonialism to hold. This is not surprising: if the cost of revolution is strictly concave, then as human capital rises, the marginal increment in the cost of revolts goes down making neopatrimonialism (through the imperfect internalisation of the Zaller effect) more and more unacceptable. In this case, neopatrimonialism and human capital accumulation are antinomic. The opposite occurs for symmetric reasons when the cost of revolution is strictly convex (unless the autonomous component of the redistribution share, c, is large enough).

Now, we examine the citizens' decision at $h = h^*$. Remember that by Corollary 1, $h^* = h^*(\beta)$ is increasing in β. At the elite's optimal level of education, the revolution condition becomes:

$$\beta > 1 - \frac{\rho(h^*(\beta)) - c}{h^*(\beta)}.$$

As one can see, the condition above imposes a lower or upper bound on the neopatrimonialism degree β. The ultimate outcome depends on the curvatures of functions $\rho(.)$ and $h^*(.)$. Rather than exploring all the possibilities as we have just done above, which is easy but tedious algebra, we consider the neutral case in which $\rho(.)$ has the same affine specification as the redistribution rate $\mu(h)$. We get the following easy result:

Proposition 3. *Suppose $\rho(h) = c' + (1 - \rho)h$, with $0 < \rho < 1$ and $\rho(w) \leq 1$, and set $c = c'$ for simplicity. The revolution condition is then fulfilled provided $\beta > \rho$.*

In this symmetric case, citizens will revolt at the elite's optimal education decision provided the degree of neopatrimonialism is large enough. Because $h^*(.)$ is increasing in β, this coincides with high enough values of education again.

Our simple theoretical model highlights that, as education rises, the probability of a revolution increases in

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strong neopatrimonial states. Indeed, Proposition 2 states that high levels of education are incompatible with high levels of neopatrimonialism. Furthermore, as the degree of neopatrimonialism is measured in our simple model by the degree of non-internalisation of the Zaller effect, optimal education by the dictators goes up when the level of neopatrimonialism rises (Corollary 1). Given this property, popular uprisings occur when the degree of patrimonialism is large enough (Proposition 3). This suggests that neopatrimonial states voluntarily investing in raising educational attainment, as many have done in the last sixty years (see Section 2) to increase national income, plant the seeds of their own destruction.

4   Empirical model and data

In this Section, we test the hypothesis, in a large panel data analysis, that a revolution is more likely to occur in neopatrimonial countries when their population becomes increasingly educated. We first provide precise definitions of 'regime changes' and 'regime breakdowns'. We then describe our econometric models and the data we use.

4.1   Regime changes and regime breakdowns

A political regime is characterised by Djuve et al. (2019) as "the set of (formal and informal) rules that are essential for selecting political leaders and maintaining them in power" (p.2). A regime change occurs when these rules are substantially altered. Such a definition covers all regime changes, in the sense that it is not restricted, for example, to a transition from 'democracy' to 'autocracy' (or vice-versa). Djuve et al. (2019) report thirteen categories of regime breakdown leading to a substantive regime change in the V-Dem database. A distinction is made between the most important and the several types of processes which led to the end of a political regime. We use the broader definition, given the fact that singling out one cause is an uncertain exercise.

Table 1 reports all types of regime breakdown which occurred during the period 1950-2017 in all independent countries still existing in 2017. Regime change is most often triggered by an elite: the military (MILCOUP), a political group (OTHCOUP), or the incumbent (SELFCOUP, DINCUMB and NODINCUMB). Revolutions (POPUR), our regime breakdown of interest, also happen although there are relatively rare events.

Table 1: Categories of regime breakdown

Name	Definition	Number
MILCOUP	Military coup d'état	163
OTHCOUP	Coup d'état by other groups	21
SELFCOUP	Self-coup to consolidate the power of incumbent leader	63
ASSASS	Assassination of sitting leader	8
NATDEATH	Natural death of sitting leader	9
CIVWL	Loss in civil war	33
INTWL	Loss in interstate war	10
FORINT	Foreign intervention	36
POPUR	Popular uprising	48
DINCUMB	Democratisation, guided by sitting regime	126
NODINCUMB	Directed transition without democratisation, guided by sitting regime	85
DNOINCUMB	Democratisation by actors outside sitting regime	16
OTH	Other	9

Note: Data from Djuve et al. (2019) for the period 1950-2017, all independent countries still existing in 2017.

4.2 Econometric model

We estimate a sequential logit model to investigate in a flexible manner how neopatrimonialism and education are related to the occurrence of a regime change, and subsequently, revolutions (Liao, 1994). We first look at the determinants of a regime change (selection equation):

$$Prob(REGCH_{it} = 1) = G(\beta_0 + \beta_1 NEOPAT_{it-1} + \beta_2 EDUC_{it-1} +$$
$$\beta3[EDUC_{it-1} * NEOPAT_{it-1}] + CVARS_{it-1}\gamma)$$

where $REGCH_{it}$ takes the value of one if a regime change occurred in country i at time t, $EDUC$ is a measure of educational attainment at time $t-1$, $NEOPAT$ is the level of neopatrimonialism. The $CVARS$ are other control variables. We estimate a logit model, where G is the logistic function.

Then, conditional on a regime change happening, we examine the determinants of the probability of a

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popular uprising taking place:

$$Prob(POPUR_{it} = 1 | REGCH_{it} = 1) = G(\delta_0 + \delta_1 NEOPAT_{it-1} + \delta_2 EDUC_{it-1} +$$

$$\delta_3[EDUC_{it-1} * NEOPAT_{it-1}] + CVARS_{it-1}\lambda)$$

We estimate the two models in sequence but separately. One worry may be that a form of selection bias occurs if the transition to a specific regime change depends on unobserved variables (Holm and Jæger, 2011). A bivariate probit selection model could be used, but, in the absence of a relevant variable only belonging to the selection equation, this sample selection correction is likely to fail (Wooldridge, 2016).[12]

Our key parameters are β_3 and δ_3. They indicate how the presence of neopatrimonialism influences the probability of a regime change and the probability of a revolution triggering this regime change, *conditional* on the country-specific level of educational attainment. We expect both coefficients to be positive, meaning that a neopatrimonial state becomes increasingly vulnerable as the level of education rises among the population.

4.3 Control variables

We have already defined, in Section 2, neopatrimonialism and education.[13] We also include in our baseline model time-varying control variables which are usually considered as standard potential determinants of social conflicts (Sambanis, 2002; Fearon and Laitin, 2003; Collier and Hoeffler, 2004; Dixon, 2009; Djuve et al., 2019): natural resources abundance (NATRES), income per capita (GDPPC), population size (POP), economic growth (GROWTH), ethnic (ETHFRAC) and religious fractionalisation (RELFRAC), the cubic polynomial of regime duration (DUR, DUR2, DUR3).

Natural resources abundance corresponds to total resource income (the volume of production of oil, gas, coal, metals times the price of these resources) per capita, expressed in 2007 US dollars, and transformed using an inverse hyperbolic sine transformation (IHS) (to deal with outliers and zero values). Data come from Haber and Menaldo (2011).[14] Log of *real income per capita* in 2011 US dollars, log of *population size* and *economic*

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[12]Nevertheless, our results are robust to the use of a Heckman probit model with identification through non-linear functional form. Furthermore, using five-year lags of education and neopatrimonialism (overall index or its components) to reduce any simultaneity bias generates qualitatively similar results. This is not surprising as values of these variables change slowly over time.

[13]Data for education are available every five years. To obtain yearly values, linear interpolation has been used.

[14]Given that values are not available beyond 2006, we used a simple linear (country) fixed effects models to predict the missing values, using as independent variable total resource rents per capita expressed in 2011 US dollars from the World Bank Development Indicators and available for the period 1970-2018 (http://wdi.worldbank.org/).

growth come from the Maddison Project Database.[15] Data for *ethnic and religious fractionalisation* come from Alesina et al. (2003). Regime change is also likely to depend on regime duration. To account flexibly for this temporal dependence, we follow Carter and Signorino (2010), and we add the cubic polynomial of *regime duration*.

It is common to include country fixed effects when dealing with panel data to control for unobserved heterogeneity. However, in doing so, we would sacrifice a large amount of between-country information (Beck and Katz, 2001), which becomes a crucial issue when dealing with a rare event such as a revolution. An initial compromise is to include *region fixed effects* to account for unobserved factors specific to a given geographic reason.[16] We can also include *decennial period fixed effects* to control for global common shocks. In other regressions, we control for time-invariant unobserved heterogeneity by including the country-specific averages of the time-varying variables (Allison, 2009).[17] In that way, our parameters of interest will be solely identified on the basis of time-series (within) variation.

Overall, our sample covers 429 regime changes in 156 countries over the period 1950-2017.

5 Results

5.1 Regime change

Our empirical results related to the determinants of regime change are presented in the first four columns of Table 2. Column [1] indicates that a high level of income per capita and fast economic growth reduce the probability of a regime change. On the other hand, a rise in neopatrimonialism increases this probability. The average marginal effect is reported at the bottom of Table 2. A 0.2 point rise in the neopatrimonialism index (ranging from 0 to 1) is associated with about a 1% increase in the probability of a regime change. This is a substantial effect, given that the average predicted probability in the full absence of neopatrimonialism is 3%. On the other hand, the coefficient on education is small, negative, and statistically insignificant, suggesting that a more educated population is not necessarily a more politically active population.

However, this would be a premature conclusion. In column [2], we interact education and neopatrimonialism. The coefficient on this interaction term is large, positive, and statistically significant. Inclusion of this variable appears therefore to improve the goodness of fit of the model (Karaca-Mandic et al., 2012). The left

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[15]https://www.rug.nl/ggdc/historicaldevelopment/maddison/

[16]The regions are Eastern Europe and Central Asia; Latin America and the Caribbean; Middle East and North Africa; Sub-Saharan Africa; Asia and pacific.

[17]This model is known as a 'hybrid', 'between-within', or 'correlated random effects' model.

panel of Figure 6 illustrates how the average marginal effect (AME) of a one point rise in neopatrimonialism increases and turns positive and statistically significant beyond four years of average education in the population. The AME doubles when education increases from four to eight years. These results suggest that the stability of a political regime is increasingly compromised in countries combining high neopatrimonialism and rising levels of education. In columns [3] and [4], we adopt a hybrid model by including the country-specific averages of the time-varying variables to mimic a fixed effects model.[18] The inclusion of these additional variables ensures that our results are not driven by unobserved time-invariant factors since identification relies on changes within countries. Our key results are qualitatively similar to our previous results. The effect of neopatrimonialism is much larger when a large fraction of the population is educated. Quantitatively, the conditional AME are larger, as highlighted by the right panel of Figure 6.

Table 2: Determinants of a regime change and revolution

|	REGCH	REGCH	REGCH	REGCH	POPUR	POPUR	POPUR	POPUR
	P	P	W	W	P	P	W	W
	([1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
EDUC	-0.083	-0.290***	-0.046	-0.476***	-0.046	-0.799*	-0.471	-1.936***
	(0.054)	(0.082)	(0.138)	(0.181)	(0.149)	(0.412)	(0.427)	(0.706)
NEOPAT	1.021***	-0.597	1.156*	-1.963**	4.462***	0.078	6.957***	-1.372
	(0.354)	(0.617)	(0.676)	(0.869)	(1.306)	(2.232)	(2.074)	(3.287)
EDUC*NEOPAT		0.316***		0.609***		1.018**		1.921***
		(0.102)		(0.133)		(0.485)		(0.635)
NATRES	-0.006	-0.011	-0.045	-0.058	-0.104	-0.115	-0.421**	-0.461**
	(0.033)	(0.073)	(0.071)	(0.082)	(0.083)	(0.200)	(0.226)
GDPPC	-0.211*	-0.173	-0.383	-0.238	0.333	0.344	1.583*	1.698*
	(0.116)	(0.118)	(0.241)	(0.254)	(0.308)	(0.306)	(0.827)	(0.900)
GROWTH	-2.564***	-2.612***	-1.916**	-2.069**	3.119*	3.374*	3.988*	5.032**
	(0.772)	(0.774)	(0.804)	(0.823)	(1.845)	(1.794)	(2.318)	(2.386)
POP	0.025	-0.001	-0.018	-0.587	0.253*	0.243	3.520	3.148
	(0.061)	(0.063)	(0.450)	(0.509)	(0.147)	(0.153)	(2.246)	(2.395)
ETHFRAC	0.328	0.325	0.230	0.210	0.151	-0.124	-0.653	-1.070
	(0.346)	(0.357)	(0.359)	(0.352)	(0.783)	(0.838)	(0.857)	(0.840)
RELFRAC	-0.463	-0.246	-0.496	-0.483	-0.191	0.068	0.202	0.344
DUR	-0.090	0.198	-1.662	0.151	-2.010	-0.432	-3.815	-1.319
	(1.235)	(1.237)	(2.833)	(2.919)	(2.899)	(2.996)	(9.820)	(10.697)
DUR2	0.113	-0.050	0.171	-0.195	2.462	1.105	-0.742	-3.737
	(1.445)	(1.449)	(2.056)	(2.119)	(3.258)	(3.538)	(3.857)	(3.496)
DUR3	0.010	0.042	-0.035	0.030	-0.852	-0.504	0.263	1.236
	(0.480)	(0.483)	(0.665)	(0.692)	(1.040)	(1.182)	(1.155)	(1.147)
	(0.389)	(0.408)	(0.395)	(0.395)	(0.908)	(0.887)	(1.210)	(1.177)
AME	0.050***		0.056**		0.367***		0.512***	
	(0.018)		(0.033)		(0.105)		(0.148)	
Observations	8,067	8,067	8,067	8,067	429	429	429	429

Notes: ***p<0.01 **p<0.05 *p<0.10. Cluster-robust standard errors are in parentheses. P: pooled model. W: within model. All regressions include region and time fixed effects.

5.2 Revolutions as regime breakdown mode

Our empirical results related to the determinants of a revolution (popular uprising) occurring given a regime change are presented in the last four columns of Table 2. In column [5], a revolution is more likely to take place in countries characterised by a large population and, contrary to the results related to the determinants of regime

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[18]A key advantage of this approach, relative to a conditional logit model, is that we can still calculate average marginal effects.

Figure 6: Average marginal effect of neopatrimonialism on the probability of a regime change conditional on education
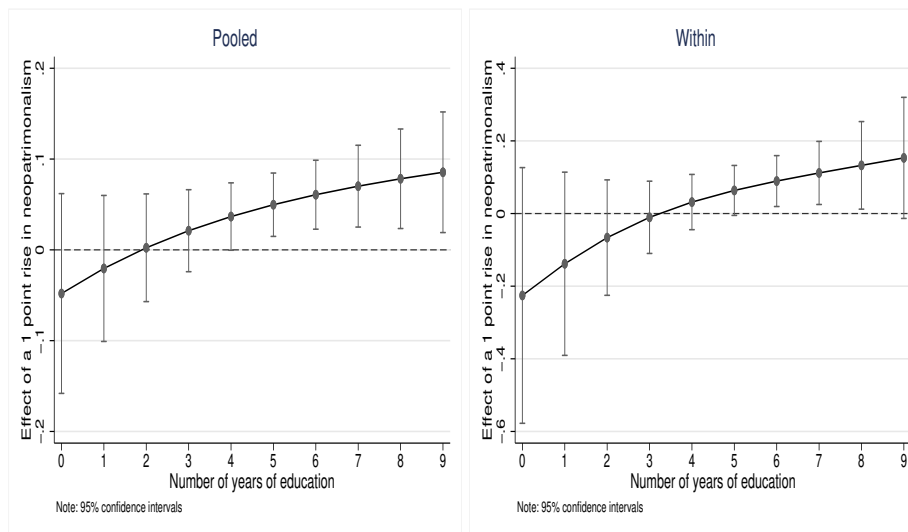

change, recent fast economic growth. The presence of neopatrimonialism has a large effect on the probability of a revolution. A 0.2 point rise in the neopatrimonialism index is associated with about a 7% increase in the probability of a revolution given a regime change. Remarkably, the average predicted probability in the full absence of neopatrimonialism is 0. On the other hand, the coefficient on education is small, negative, and statistically insignificant. Taking these results at face value, it would appear that a more educated population is not more likely to engage in popular uprising.

However, column [6] highlights again the importance of considering simultaneously neopatrimonialism and education. The coefficient on their interaction term is large, positive, and statistically significant. The left panel of Figure 7 shows that a rise in neopatrimonialism has a positive effect on the probability of a revolution only if the population has at least three years of education. In addition, although the confidence intervals are large, the AME of neopatrimonialism increases with higher education levels. In columns [7] and [8], we adopt a hybrid approach. It is important to keep in mind that revolutions only took place in 32 countries. Hence, we are relying on a very small sample of countries for identification. Nevertheless, qualitatively, our results are unchanged in comparison to columns [5] and [6]. Quantitatively, Figure 7 shows that at four years of education, the AME of neopatrimonialism reaches its maximum impact.

Overall, lower combinations of neopatrimonialism and education seem necessary to trigger a revolution once a regime change is happening.

Figure 7: Average marginal effect of neopatrimonialism on the probability of revolution as regime breakdown, conditional on education
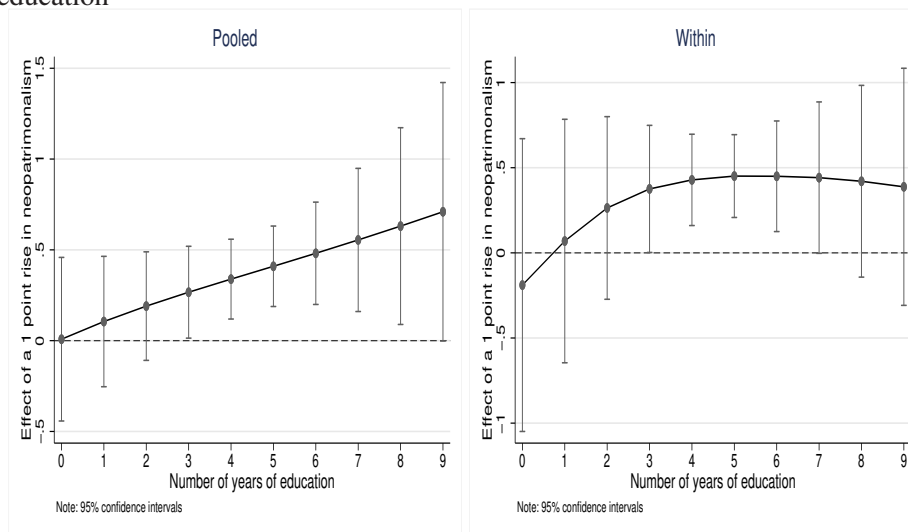
5.3 Is revolution the most likely regime breakdown?

We have assumed that the most likely regime breakdown in presence of the combination of high neopatrimonialism-high education is a revolution. We explore the validity of this assumption by looking at how the interaction of education and neopatrimonialism influences the probability of each different type of regime breakdown occurring, besides a popular uprising. We provide two sets of results: without and with time and region fixed effects. Indeed, given the low frequency of some types, the introduction of these fixed effects can lead to perfect prediction of the outcome. In that case, the concerned observations are dropped from the model before estimation.

Table 3 shows the absence of impact of the interaction of education and neopatrimonialism on the probability of any type of regime breakdown taking place. In other words, revolution is indeed the most likely event associated with a regime change when the latter is happening in a country combining a relatively high level of education and a relatively high level of neopatrimonialism.

5.4 Is the Arab Spring a specific case?

It could be argued that the Arab Spring in MENA is a specific case, driving our results. To investigate this in a rough manner, we omit the MENA countries from our sample and replicate the analysis carried out in Table 2. Table 4 shows that the estimates are very similar across Tables. Interpreting the results linearly using odd ratios (the odds are $\frac{Prob(y=1|x)}{Prob(y=0|x)}$), a 0.2 point rise in neopatrimonialism in the presence of five years of education

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Table 3: Impact of the interaction of education and neopatrimonialism on other regime breakdowns

	MILCOUP [1]	OTHCOUP [2]	SELFCOUP [3]	ASSASS [4]	CIVWL [5]	INTWL [6]	FORINT [7]	DINCUMB [8]	NODINCUMB [9]	DNOINCUMB [10]	OTH [11]
EDUC	-0.462**	0.165	-0.144	-0.569	0.288	0.228	0.016	0.039	0.212	0.117	-0.767*
	(0.183)	(0.285)	(0.206)	(0.730)	(0.414)	(0.344)	(0.271)	(0.144)	(0.146)	(0.300)	(0.399)
NEPAT	-1.414	2.710	0.443	1.458	4.206	3.450	2.145	-2.195*	0.453	-3.142	-5.818
	(1.238)	(2.615)	(1.580)	(3.183)	(2.782)	(3.088)	(1.959)	(1.250)	(1.388)	(3.447)	(4.011)
EDUC*NEOPAT	0.254	-0.561	0.086	0.747	-0.367	-0.398	-0.180	0.210	-0.357	0.363	1.460**
	(0.242)	(0.388)	(0.275)	(1.144)	(0.573)	(0.331)	(0.342)	(0.196)	(0.218)	(0.438)	(0.674)
Observations	429	429	429	429	429	429	429	429	429	429	429
	[1']	[2']	[3']	[4']	[5']	[6']	[7']	[8']	[9']	[10']	[11']
EDUC	-0.411*	0.422	-0.163	0.270	-0.018	0.312	0.579	-0.038	0.250	-0.088	-2.313***
	(0.214)	(0.403)	(0.274)	(0.739)	(0.512)	(0.445)	(0.158)	(0.158)	(0.162)	(0.269)	(0.724)
NEOPAT	-1.709	3.641	0.615	2.031	2.327	5.267	5.421*	-2.406*	1.157	-2.500	-21.340***
	(1.327)	(3.223)	(1.878)	(3.711)	(3.852)	(4.442)	(2.787)	(1.299)	(1.500)	(3.225)	(4.706)
EDUC*NEOPAT	0.412	-0.526	0.076	-0.223	-0.102	-0.566	-0.977*	0.248	-0.465**	0.317	4.680***
	(0.280)	(0.454)	(0.354)	(1.049)	(0.764)	(0.442)	(0.536)	(0.206)	(0.215)	(0.377)	(1.018)
Observations	429	387	429	277	366	232	410	429	429	193	227

Notes: ***p<0.01 **p<0.05 *p<0.10. Cluster-robust standard errors are in parentheses. Pooled models only. Regressions denoted by ' include region and time fixed effects. All control variables are included but not reported.

increases the odds of a regime change by a factor of ($exp(0.2 * (-0.597 + 0.316 * 5) =)$ 1.22 (1.24) in column [2] of Table 2 (4) and increases the odds of a revolution conditional on a regime change by a factor of 2.81 (2.53) in column [6] of Table 2 (4).

Table 4: Determinants of a regime change and revolution, without MENA countries

	REGCH	REGCH	REGCH	REGCH	POPUR	POPUR	POPUR	POPUR
	P ([1]	P [2]	W [3]	W [4]	P [5]	P [6]	W [7]	W [8]
EDUC	-0.097*	-0.274***	-0.193	-0.618***	-0.061	-0.726*	-0.970**	-2.483***
	(0.054)	(0.086)	(0.154)	(0.193)	(0.161)	(0.417)	(0.442)	(0.800)
NEOPAT	1.092***	-0.265	1.462**	-1.627*	3.938***	0.174	6.993***	-1.463
	(0.366)	(0.643)	(0.673)	(0.913)	(1.365)	(2.144)	(2.289)	(3.925)
EDUC*NEOPAT		0.269**		0.597***		0.897*		1.872**
		(0.109)		(0.145)		(0.461)		(0.755)
Observations	7,031	7,031	7,031	7,031	377	377	377	377

Notes: ***p<0.01 **p<0.05 *p<0.10. Cluster-robust standard errors are in parentheses. P: pooled model. W: within model. All regressions include region and time fixed effects. All control variables are included but not reported.

5.5 Is neopatrimonialism a proxy for macroeconomic conditions?

Campante and Chor (2014) propose, and empirically show, that the combination of a well-educated population (more likely to engage in political activities) and weak macroeconomic conditions (which reduce the opportunity costs of engaging in political activities) tends to increase the probability of a change in the executive. They then suggest that this combination can notably explain the Arab Spring. Given that neopatrimonialism and income per capita are negatively correlated (r≃ -0.46), it is possible that our interaction effect acts as a proxy for the interaction effect between education and income per capita suggested by Campante and Chor (2014).[19]

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[19]It is important to note that Campante and Chor (2014) used a different dependent variable: the occurrence of at least one executive change during a five-year period. An executive change can happen without it being associated to a regime change as long as the institutional rules are not substantially changed; e.g. the nomination of a new Prime Minister in the United Kingdom. Hence, we are simply not looking at the same outcome.

Table 5: The interaction of education with macroeconomic conditions

VARIABLES	REGCH	REGCH	POPUR	POPUR	REGCH	REGCH	POPUR	POPUR	REGCH	REGCH	POPUR	POPUR
	P	W	P	W	P	W	P	W	P	W	P	W
	([1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
EDUC	0.037	-0.101	0.176	1.394	-0.117**	-0.055	-0.089	-0.355	-0.140*	-0.173	-0.022	-0.279
	(0.189)	(0.330)	(0.647)	(1.253)	(0.050)	(0.136)	(0.146)	(0.409)	(0.077)	(0.158)	(0.162)	(0.503)
EDUC*GDPPC	-0.019	0.005	-0.031	-0.182								
	(0.021)	(0.031)	(0.075)	(0.128)								
EDUC*GROWTH					-0.058	-0.056	0.168	-2.456				
					(0.338)	(0.318)	(0.882)	(1.494)				
EDUC*AVUNEMP									0.567	0.702	0.478	0.860
									(0.547)	(0.853)	(0.743)	(1.855)
Observations	8,067	8,067	429	429	8,067	8,067	429	429	7,358	7,358	391	391

Notes: ***p<0.01 **p<0.05 *p<0.10. Cluster-robust standard errors are in parentheses. P: pooled model. W: within model. All regressions include region and time fixed effects. All control variables are included but not reported.

To investigate this possibility, we interact education with either the log of income per capita (GDPPC) in columns [1]-[4] or economic growth (GROWTH) in columns [5]-[8] of Table 5. Across columns, the coefficients on the interaction are small, statistically insignificant, and not always negative. Hence, we find little support for Campante and Chor (2014)'s hypothesis. In columns [9]-[12], we use as proxy for weak labour conditions for educated people, the unemployment rate for workers with an advanced degree. Given the scarcity of data, we average all data available for each country over the period 1990-2017 (AVUNEMP).[20] We still fail to find a statistically significant coefficient on this new interaction term.

5.6 Is neopatrimonialism a proxy for electoral autocracy?

We have stressed that the characteristics of a neopatrimonial state are much more likely to be incompatible with education than the simple absence of electoral democracy. Figures 8 and 9 report the conditional AME when we substitute the Polity score (inverted such as higher values mean more autocracy and ranging from -1 to 1) for the index of neopatrimonialism. Indeed, we observe that neopatrimonialism is not another name for electoral autocracy. In comparison to Figures 6 and 7, the AME are smaller, less precisely estimated, and the role of education is much less clear, especially when looking at the determinants of revolutions.

5.7 Which features of neopatrimonialism matter the most?

As previously indicated, the neopatrimonialism index is the aggregation of three components: clientelism, presidentialism, (regime) corruption. Clientelism (CLIENT) is the targeted, contingent distribution of resources (goods, services, jobs, money, etc) in exchange for political support. Presidentialism is systemic concentration of political power in the hands of only one individual (PRES). Corruption is the extent to which political actors (executive, legislative, judiciary) use political office for private or political gain (CORR). Some of these components may matter more than other to explain regime change and/or a revolution taking place.

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[20]Data come from the World Bank Development Indicators.

Figure 8: Average marginal effect of electoral autocracy on the probability of a regime change conditional on education
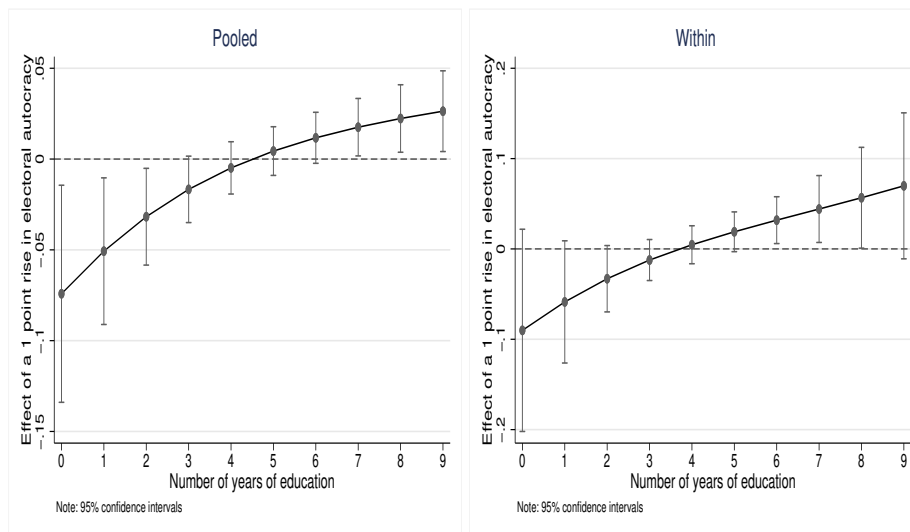

Figure 9: Average marginal effect of electoral autocracy the probability of revolution as mode of regime breakdown, conditional on education
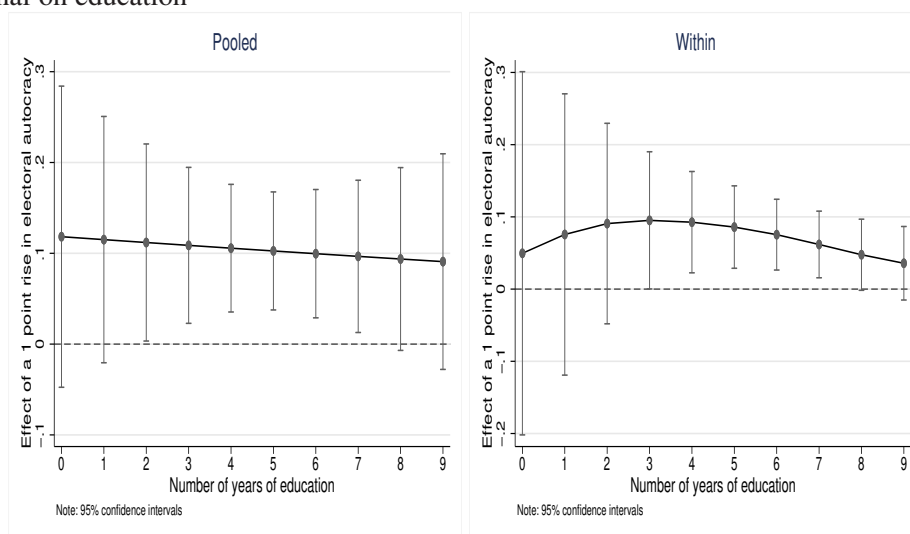

Table 6 reports our results when we interact, in turn, education with each component of neopatrimonialism. For ease of interpretation, we can use odds ratio, calculating the effect of a 0.2 point rise in a given component (they all range between 0 and 1) at an education level of five years. For regime change, using the pooled estimates, we obtain a factor increase of 1.19, 1.25, 1.23. For a revolution, using again the pooled estimates, we obtain a factor increase of 3.04, 1.16, 2.03. Whereas a rise in all components of neopatrimonialism have the same relative impact on the odds of a regime change, a rise in clientelism, and, to a lower extent, corruption matters much more than a rise in presidentialism to explain the probability of a revolution conditional on a regime change. In other words, people are much more likely to revolt when neopatrimonialism is associated

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Table 6: The components of neopatrimonialism

	REGCH	REGCH	POPUR	POPUR	REGCH	REGCH	POPUR	POPUR	REGCH	REGCH	POPUR	POPUR
	P ([1])	W [2]	P [3]	W [4]	P [5]	W [6]	P [7]	W [8]	P [9]	W [10]	P [11]	W [12]
EDUC	-0.213*** (0.082)	-0.270 (0.180)	-1.005*** (0.352)	-1.340** (0.591)	-0.272*** (0.084)	-0.412** (0.169)	-0.167 (0.231)	-1.013* (0.553)	-0.220*** (0.073)	-0.327 (0.201)	-0.913*** (0.326)	-1.431** (0.620)
CLIENT	0.017 (0.670)	-0.977 (0.899)	-3.262 (2.265)	-0.243 (3.196)								
EDUC*CLIENT	0.198 (0.121)	0.355** (0.171)	1.314*** (0.441)	1.531** (0.697)								
PRES					-0.857 (0.553)	-1.659** (0.750)	2.532 (1.749)	2.752 (3.217)				
EDUC*PRES					0.286*** (0.098)	0.513*** (0.119)	0.181 (0.262)	0.540 (0.456)				
CORR									0.040 (0.555)	-1.359* (0.798)	-1.701 (1.397)	-2.547 (1.894)
EDUC*CORR									0.231** (0.101)	0.362** (0.155)	1.150*** (0.351)	1.536*** (0.575)
Observations	8,067	8,067	429	429	8,050	8,050	429	429	8,067	8,067	429	429

Notes: ***$p<0.01$ **$p<0.05$ *$p<0.10$. Cluster-robust standard errors are in parentheses. P: pooled model. W: within model. All regressions include region and time fixed effects. All control variables are included but not reported. 17 observations are missing for Bahrain for 'PRES'.

with the 'privatisation' of overall resources for the benefit of a specific fraction of the population.

These results are in line with the factors highlighted by Devarajan and Ianchovichina (2017) and Arampatzi et al. (2018) to explain the Arab Spring. They stress the importance of the shared dissatisfaction in the Arab world at the eve of the Arab Spring with quality of life (which can include access to public services), unemployment, clientelism ('wasta'), and corruption. The 'people' seem more likely to take matters in their own hands when a large number feels relatively deprived.

## 5.8   What happens to neopatrimonialism after a revolution?

Throughout the paper, we have argued that educated people engage in a revolution because they develop a growing intolerance for neopatrimonialism. We would then expect to observe lower levels of neopatrimonialism after a revolution. We test this hypothesis by regressing future values of neopatrimonialism ($t+1...t+10$) on a revolution dummy variable in t and the other variables included in our previous econometric models using the sample of observations for which a regime change happens.[21] This approach is similar to the local projections method developed by Jordà (2005) to estimate impulse responses.

Figure 10 shows that countries undergoing a revolution tend to experience a substantial and statistically significant decline in neopatrimonialism the following ten years. It takes a full year for new institutional arrangements to emerge and the lower values of the (relatively imprecise) estimates over time suggest that neopatrimonialism can slightly bounce back. Overall, we find, as we expected, that popular uprisings are associated

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[21]These variables are the first lags of log of income per capita, economic growth, log of population, neopatrimonialism, education, duration, region and period fixed effects.

with subsequent lower levels of neopatrimonialism.

Figure 10: Impact of a revolution on the subsequent values of neopatrimonialism
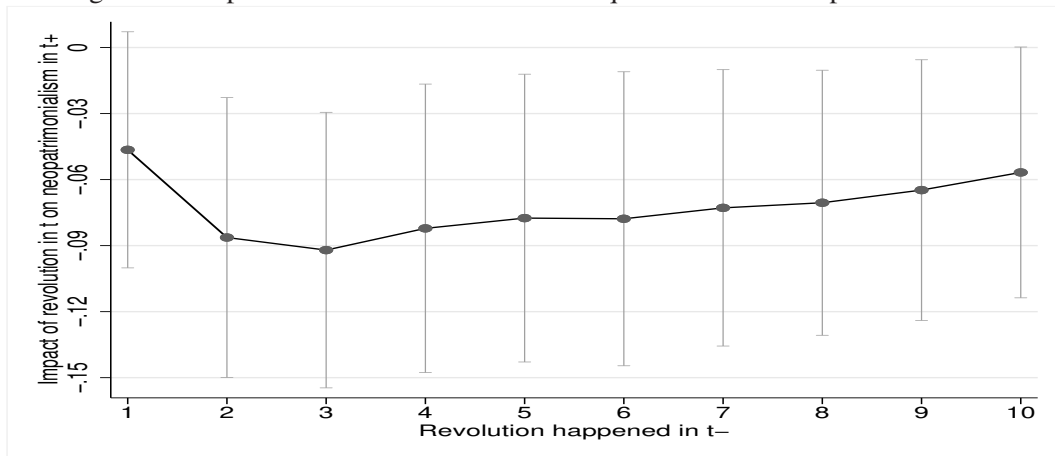
6 Conclusion

We have shown in this paper that political events such as the 'Arab Spring' are much less puzzling when we consider the incompatibility between education and neopatrimonialism. A more educated population is a population much less likely to accept restrictions on their political and economic freedoms, inequality of opportunity, or gross violations of norms of fairness. The recent protests in Algeria and Lebanon (2019-2020) provide credence to this interpretation. It is also certainly not a coincidence that MENA countries which have not experienced a revolution, such as Morocco and Jordan, are those which have accelerated their process of political liberalisation since 2010. Of course, our results ought not be interpreted as precise forecasts of revolutions. The interaction between education and neopatrimonialism that we put forward raises the probability of a popular uprising but it is often a seemingly innocuous event which concretises the latent regime change. Our empirical analysis also highlights the large diversity of regime breakdowns, regime changes, and political regimes that countries experience. It is important to go beyond the binary categorisation of autocratic vs democratic regimes. Lastly, our theoretical model suggests an interesting link between neopatrimonialism and investment in education. We aim to explore this issue in further research.

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