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Explaining the Policy Constraints of Anti-democratic Regimes by Means of Sequential OLS-Regressions

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Abstract

One of the key problems of many sociological regression models is their modest explanatory power. This has not only to do with the insufficient development of the underlying theories but also with the free will of the concerned social actors, which manifests itself in irrational, spontaneous, and sometimes even arbitrary decisions. The foreign and economic policy of the US government under Donald Trump is an excellent example of this source of indeterminacy.

An alternative and more promising approach is an explanation of the *constraints* of social behaviour by the unequal distribution of power resources and the competing interests of the actors concerned. This approach requires, on the one hand, enough observational data which include cases that reached the analysed constraints. On the other hand, there is a need for statistical procedures which estimate and explain these constraints. Assuming that sufficient amounts of data are available, this paper proposes the use of sequential OLS regressions, which eliminate step by step non-critical observations in order to identify the cases that reached the mentioned constraints.

For illustrative purposes, the author analyses the policy space of anti-democratic regimes with regard to their possibilities of curbing democracy. On the basis of the democracy scores of Freedom House, the author explores the governmental constraints set by (i) national civil societies and (ii) international NGOs for the promotion of political/civil rights. The related sequential regressions allow for an assessment of how effective the different constraints are and how far democracy may deteriorate in the worst case under given structural conditions.

Key words: Policy constraints, OLS regression, International comparisons, Democratisation, Anti-democratic regimes.



1. INTRODUCTION AND OVERVIEW

Regression models of social or economic behaviour are often based on unrealistic assumptions about the rationality and the emotional stability of the actors which they intend to describe. They yield regression lines and ex-post predictions, which typically neglect the actors' free will, emotionality, and spontaneous shifts in preferences (Earman 1986: chap. 12). This problem is especially critical for analyses which are not focused on statistically aggregated behaviour of groups, but rather on decisions of particular actors. Consequently, these analyses often have only limited explanatory power (see e.g. Hibbs (1973: chap. 6) about the behaviour of political elites). Moreover, they are generally hard to cross-validate with data from similar samples, which is currently discussed as the so-called *replication crisis* of the social sciences (Hughes 2018: chap. 1; Schmidt 2017).

In view of this unsatisfactory situation, the present article promotes an alternative approach: it proposes to analyse *possible* instead of *real* decision-making behaviour. In this article, possible behaviour is assumed to be constrained by the power and the interests of other actors. This assumption promises ex-post forecasts, which are more *reliable* and *robust* because they depend not only on the arbitrary plans of one but of *several* actors with contradictory interests. Moreover, it adds to the explanation of social behaviour by *teleological/final causation* (Stout 1996: chap. 3; Schueler 2003: chap. 3) another important element: constraints by the power and will of others, which make for the analysed actor certain forms of behaviour impossible (Mueller 2012). It is obvious that this approach also requires new statistical techniques in order to estimate the mentioned behavioural constraints from the available observational data. For this purpose, we propose in this article a sequential regression procedure which excludes step by step all observations that are not sufficiently close to the analyzed constraint-line (see section 3, Fig. 3). At the end of this elimination process the only observations remaining are those which represent the focused constraint and these can consequently be used to identify it.

In order to illustrate this constraint-approach as well as its methodological implications, the article analyses the policy space of governments with regard to the curbing of democratic freedom, which is described by time series of the political rights index (PR) of Freedom House (2017) for ca. 180 countries and territories. Two types of constraints of this policy space are considered: political protests of the *national civil society* and trade or consumer boycotts organized or induced by *international NGOs*. Both constraints together define the governmental policy space, which can be used for *forecasts* about future democratic freedom. The two constraints may, however, also be compared with regard to their *relative importance*. The related empirical analyses reveal that neither are very effective, especially if the political rights of the civil society are already restricted by an

authoritarian government. However, civil society is generally more important than international NGOs, except in countries with strongly authoritarian regimes and high trade dependency, for which our empirical analyses show that international NGOs are more effective than civil society.

2. A MODEL OF THE GOVERNMENTAL POLICY SPACE: THE CASE OF POLITICAL FREEDOM

This article is based on the hypothesis that democracy is a universal value, which triggers the expectations of many actors, hoping for increased *political freedom* in terms of popular participation in the political decision-making process. One of these collective actors is the *national civil society*, which is directly concerned by any change of its political system. Its weapons for defending democracy are political protests, votes for or against the ruling government, etc. Another important actor is the *international community of NGOs*, which aims at promoting democracy and human rights on a global scale, e.g. by inducing economic sanctions by the UN, international trade boycotts, etc. This second, international group includes Freedom House, Human Rights Watch, Amnesty International, etc.

The expectation E_i of any of these groups i with regard to the political freedom F_+ at a future point in time is assumed to be guided by the following three principles, which together represent our *hypothesis 1*:

a) If the current political freedom F is at the lowest possible level $F = F_{\min}$, the group i expects an increase of freedom by a positive *basic expectation* b_i . Thus

$$\text{If } F = F_{\min} \rightarrow E_i = F_{\min} + b_i$$

where $b_i > 0$ (1a)

b) If the current political freedom F is at the highest possible level $F = F_{\max}$, the expectations of group i are already fulfilled, since freedom cannot be increased anymore. Thus

$$\text{If } F = F_{\max} \rightarrow E_i = F_{\max} \quad (1b)$$

c) All other cases are treated by linear interpolation between situations (a) and (b). Thus

$$E_i = F + \Delta$$

where $\Delta = b_i * (F_{\max} - F) / (F_{\max} - F_{\min})$ (1c)

As Fig. 1 demonstrates, the expectation E_i about the future freedom F_+ increases with the current level of freedom F , whereas the gap Δ between F and the expectation E_i decreases with the current level of freedom F .

In principle, the level of future freedom F_+ can *deviate by a factor D_i* from the expectation E_i of a group i ; however, only as much as the *tolerance T_i* of the group with regard to the violation of its interests permits. Hence, we postulate as *hypothesis 2*:

$$D_i = (E_i - F_+) / E_i \leq T_i, \text{ for all groups } i \quad (2)$$

Thus, there are *possible* choices of freedom F_+ and *impossible* ones. The latter would create so many deprivations (Gurr 2010: chap. 2) that government risks revolutionary violence (Davies 1972) or harsh international trade sanctions (Cleveland 2015). It is important to note that for possible choices *all* inequalities of equation (2) must be fulfilled. Hence, each group has a “veto” against the choice of F_+ if it violates its expectations E_i in an intolerable way. This motivates the research interest in identifying the *most important* among the different groups, which represents the critical constraint of the governmental policy space. The answer to this question depends on the relative effectiveness of the different groups in defending their expectations, which has to be explored by *empirical* analyses (see section 6).

Regarding the *tolerance T_i* , there are many different factors, like political traditions, authoritarian culture, etc., which could be taken into consideration.

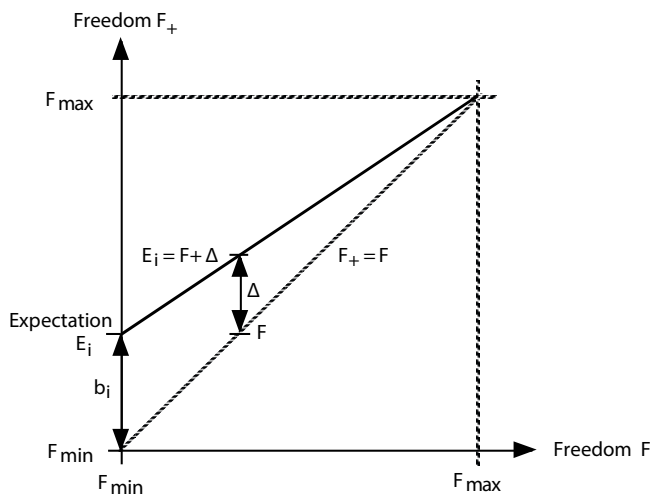


Fig. 1: The hypothetical relation between the current polit. freedom F and the expectation E_i about the polit. freedom F_+ at a future point in time

However, for analysing which of the governmental policies are really possible, the most important of these factors is, according to section 1, the *political power* P_i that can be used by the group i against a governmental decision: the more power P_i the group i has, the smaller its tolerance for deviance from its expectations. Thus, we postulate as *hypothesis 3*:

$$T_i = k_i + c_i * P_i,$$

where $k_i > 0$ and $c_i < 0$ (3)

The combination of the equations (2) and (3) yields the condition for possible choices of the future freedom F_+ :

$$D_i = (E_i - F_+) / E_i \leq k_i + c_i * P_i = T_i$$
(4)

If condition (4) is violated, the related decision about F_+ is impossible, as indicated in Fig. 2. Thus, there is a *constraint* C_i for possible decisions about F_+ , which can be derived from equation (4)¹⁾ and leads to the following *hypothesis 4*:

$$C_i = E_i * (1 - k_i - c_i * P_i) \leq F_+$$
(5)

Since $c_i < 0$, the constraint line C_i *increases* with the power P_i and, consequently, narrows the governmental *policy space* of possible decisions if the group i becomes more powerful (see Fig. 2).

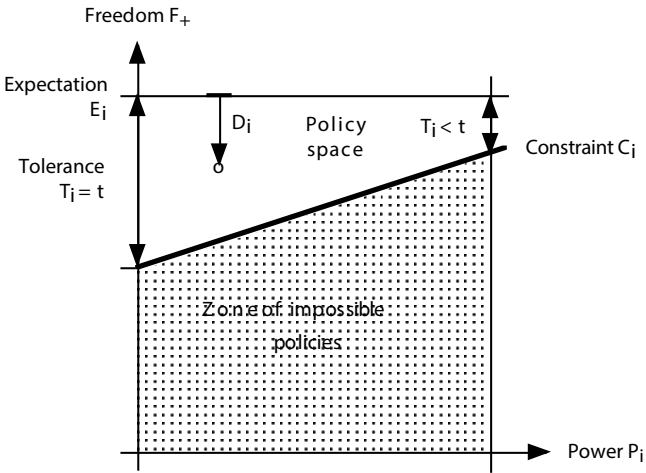


Fig. 2: The hypothetical relations between the power P_i , the tolerance T_i , and the resulting constraint C_i

3. OPERATIONALISATIONS AND ESTIMATIONS FOR TESTING THE MODEL

For empirical tests of the previous hypotheses 1 – 4, most of the theoretical concepts of section 2 have to be measured or estimated for two groups of actors i , i.e. the national civil society ($i = \text{nat}$) and the international community of NGOs ($i = \text{int}$), which aim at promoting democracy.

The most important variables to be operationalised are *freedom* F and F_+ . We are using for this purpose the political rights index PR of Freedom House (2017).²⁾ It is a complex democracy index³⁾, which is often cited by UN-agencies and the World Bank (Giannone 2010: 75-76) as well as the daily news media. Nonetheless, for this article the index PR has two major drawbacks: first, in the short run it doesn't change too much and second, it has a polarity which is the reverse of political freedom. Thus, we focused on a 5-year interval with more change and inverted its polarity such that

$$F = F_{2011} = 8 - (\text{Polit. Rights PR in 2011}) \quad (6a)$$

$$F_+ = F_{2016} = 8 - (\text{Polit. Rights PR in 2016}) \quad (6b)$$

From the definitions of the original PR -indicators it follows that $F_{\min} = 1$ and $F_{\max} = 7$.

The measurement of the *expectations* $E_i = E_{\text{nat}}$ and $E_i = E_{\text{int}}$ is much more difficult. According to the equations (1a-c), they depend on one single parameter, i.e. the *basic expectation* b_i . Thus, we used different working hypotheses about possible values of b_i and finally selected the one with the best fit r^2 between the theoretical and the real tolerance for deviance T_i (see Fig. 3). In this way we achieved the best possible statistical estimate of E_i and implicitly determined the values of the deviances

$$D_i = (E_i - F_+) / E_i \quad (7)$$

As postulated by *hypothesis 3*, the maximum possible deviance T_i depends on the *power* P_i of the national civil society ($i=\text{nat}$) and the international community of NGOs ($i=\text{int}$), which also had to be operationalised in order to enable empirical tests. The power of the *international NGOs* over the government of a particular target country is very much influenced by its *trade dependency*. The more dependent the country is on international trade, the more vulnerable it is to boycotts, either organised by governments or consumer movements (Hufbauer et al. 2009: 62). Thus, we operationalised the power

$$P_{int} = 100 * (\text{Foreign trade in 2011}) / (\text{GDP in 2011}) = \text{TradeDep}_{2011} \quad (8a)$$

by making use of the trade dependency data which the World Bank (2019) has published for the year 2011.

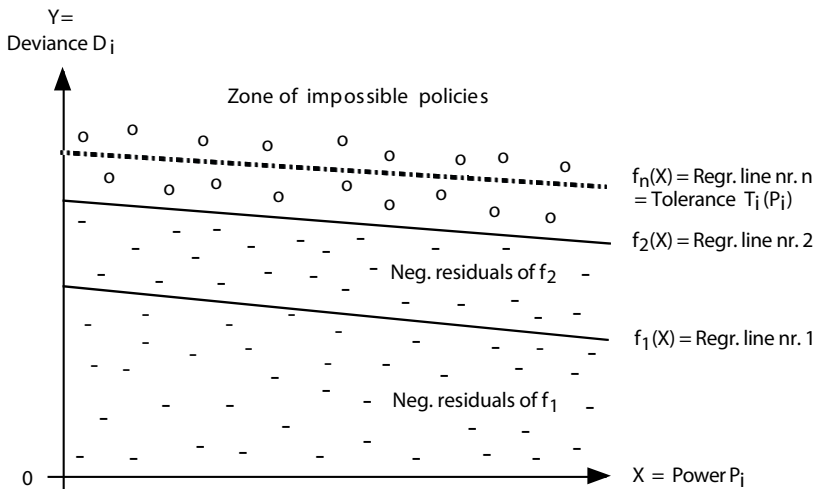
The power of the *national civil society* in relation to its government is mainly influenced by its political rights. The more political rights, the better the chances of forcing a government out of office, e.g. by democratic elections or massive political protest (Hibbs 1973: 112). Thus, we operationalised the power

$$P_{nat} = F_{2011} = 8 - (\text{Polit. Rights PR in 2011}) \quad (8b)$$

where PR is the political rights index of Freedom House (2017).

According to equations (3) and (4), the deviance D_i is limited by the tolerance T_i such that the following inequality holds for both groups, i.e. $i = nat$ and $i = int$:

$$D_i \leq T_i = k_i + c_i * P_i \quad (9)$$



Legend: Dependent variable: Deviance D_i ; Independent variable: Power P_i ; Sample for f_1 : all $D_i \geq 0$; Sample for f_2 : all D_i , excl. neg. residuals of f_1 ; Sample for f_3 : all D_i , excl. neg. residuals of f_1 and f_2 ; Sample for f_n : all D_i , excl. neg. residuals of f_1, \dots, f_{n-1} .

Fig. 3: The estimation of the tolerance for deviance T_i and the related parameters k_i and c_i by successive linear regressions.

Assuming that b_i , E_i , D_i , and P_i are all known, either by measurement or plausible working hypotheses, the tolerance T_i and the related parameters k_i and c_i could be estimated by the following iterative process, which is visualised in Fig. 3 and described in an earlier article by the author (Mueller 2012: 82). It is a special form of the iteratively reweighted least squares technique (Rubin 1983; Andersen 2008: 52 ff.) and starts with a conventional OLS regression, where $Y = D_i$ is the dependent and $X = P_i$ the independent variable. Since we are interested in violations of expectations, Y is restricted to cases where $D_i \geq 0$. After removing the non-critical observations below the regression line $f_1(X)$ with *negative* residuals, the remaining data are used for a second regression analysis ⁴⁾, which yields the regression line $f_2(X)$. Since we are mainly interested in the highest possible deviances D_i for a given value $X = P_i$, we have to remove all cases with negative residuals below the line $f_2(X)$. By repeating this process of estimating regression lines $f_j(X)$ and subsequently removing the related negative residuals, the process finally converges to the upper margin of the data cloud, which corresponds to the tolerance T_i . It is recommended that this process is stopped after a rather limited number of n regressions such that the final regression equation $f_n(X)$ is calculated with ca. 10% of the original data points. In this way ca. $10\% / 2 = 5\%$ ⁵⁾ of all D_i are in so far “rare” observations as they are beyond the limit T_i . As mentioned earlier, this regression procedure can be repeated for different working hypotheses about the basic expectation b_i and the associated E_i and D_i . By choosing the b_i with the best final r^2 , sequential regression also yielded estimates for E_i (see eqns. (1a–c)) and D_i (see eqn. (7)).

4. THE ESTIMATION OF THE NATIONAL CONSTRAINTS

By means of the previous sequential regression procedure it is possible to estimate the tolerance T_{nat} (see hypothesis 3) of the national civil society

$$T_{\text{nat}} = k_{\text{nat}} + c_{\text{nat}} * P_{\text{nat}} = k_{\text{nat}} + c_{\text{nat}} * F_{\text{2011}},$$

where $k_{\text{nat}} > 0$ and $c_{\text{nat}} < 0$ (10)

as well as the related constraint (see eqn. (5))

$$C_{\text{nat}} = E_{\text{nat}} * (1 - k_{\text{nat}} - c_{\text{nat}} * F_{\text{2011}}) \quad (11)$$

We ran this estimation process for different plausible working hypotheses about the expectations E_{nat} and the associated parameter b_{nat} , which were systematically varied between $b_{\text{nat}} = 0$ and $b_{\text{nat}} = 3$. Tab. 1 presents the best fitting results of these

trials. By comparing the adjusted r^2 of the final models A4, B4, and C4, it turns out that $b_{nat} = 2.00$ (see model B4) yields the best correspondence between model and data. Thus, for $F_{2011} = F_{min} = 1$, the national civil society expects an increase of freedom to $F_+ = F_{min} + 2 = 3$ (see eqn. (1a)). Moreover, as hypothesised in equation (10), $k_{nat} > 0$ and $c_{nat} < 0$ have the theoretically expected signs. They are statistically highly significant and consequently give the final model B4 a high explanatory power with an adjusted $r^2 = 0.899$. The related Fig. 4a seems to confirm the importance of the resulting constraint C_{nat} . A comparison with Fig. 4b illustrates the superiority of the presented approach of explaining the *possible* instead of the *real* governmental behaviour: Fig. 4b visualises for the same data cloud as Fig. 4a a *conventional* regression analysis with $b_{nat} = 2.00$, which corresponds to the model B1 of Tab. 1. However, the regression line of Fig. 4b has an explanatory power adj. r^2 of only 0.718 instead of 0.899 (see Tab. 1) and displays the lower determinacy of the behavioural forecast, which is due to many high residuals that were intentionally excluded when calculating the model B4.

Tab. 1: Parameter estimation of the national tolerance for deviance T_{nat}

Sequential model	Basic exp. b_{nat}	Const. k_{nat}	Coeff. c_{nat}	N abs.	N rel.	Adj. r-sq.
A1	1.50	0.647***	-0.093***	176	1.000	.725
A2	1.50	0.805***	-0.110***	105	0.597	.899
A3	1.50	0.903***	-0.109***	34	0.193	.826
<u>A4</u>	<u>1.50</u>	<u>0.921***</u>	<u>-0.100***</u>	<u>20</u>	<u>0.114</u>	<u>.882</u>
B1	2.00	0.694***	-0.100***	184	1.000	.718
B2	2.00	0.873***	-0.120***	105	0.571	.921
B3	2.00	0.953***	-0.116***	34	0.185	.854
<u>B4</u>	<u>2.00</u>	<u>0.969***</u>	<u>-0.107***</u>	<u>20</u>	<u>0.109</u>	<u>.899</u>
C1	2.50	0.753***	-0.108***	185	1.000	.761
C2	2.50	0.924***	-0.127***	105	0.568	.933
C3	2.50	0.993***	-0.121***	34	0.184	.874
<u>C4</u>	<u>2.50</u>	<u>0.932***</u>	<u>-0.081***</u>	<u>16</u>	<u>0.086</u>	<u>.868</u>

Legend: Underlined: Final model for given b_{nat} . Bold underlined: Best final model. One-tailed significances: ***: $p \leq .001$, **: $p \leq .01$, *: $p \leq .05$. N rel.: Relative sample size in comparison to the first model of a given b_{nat} . Adj. r-sq.: Adjusted r-square = Fit of the model. Samples of the original models A1, B1, C1: Global full-samples, i.e. all countries and territories for which Freedom House (2017) has data. Dependent variable: D_i . Restriction $Di \geq 0$. Independent variable: F_{2011} , which is sufficiently different from D_i in order to avoid an autocorrelation (see eqns. (1c) and (7)).

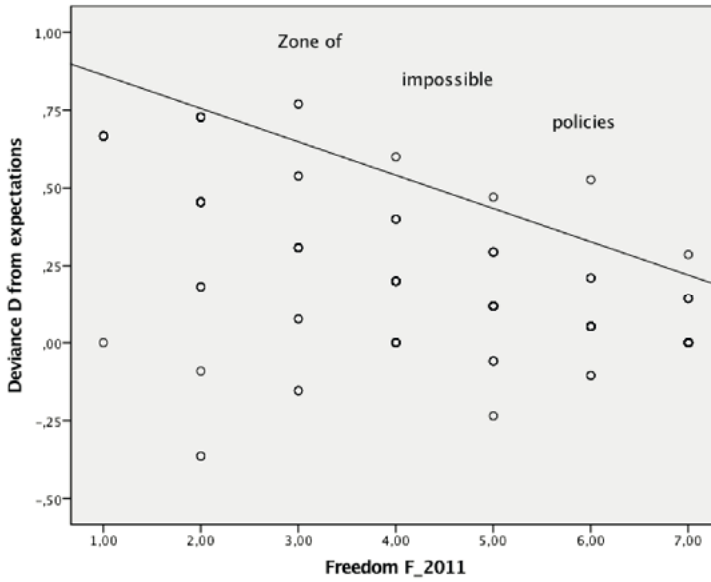


Fig. 4a: Explaining the constraint C_{nat} of governmental behaviour by successive linear regressions ⁶⁾

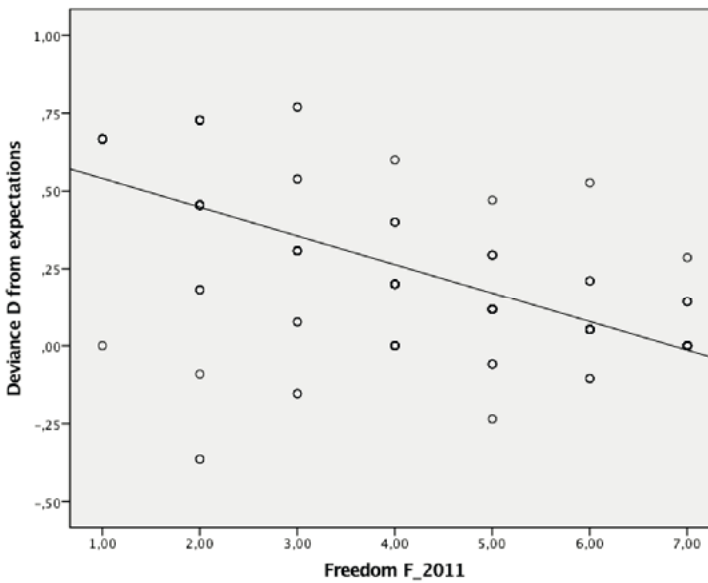


Fig. 4b: The classical approach: Explaining real governmental behaviour by ordinary linear regression ^{6), 7)}

5. THE ESTIMATION OF THE INTERNATIONAL CONSTRAINTS

For the community of international NGOs there are mathematical expressions similar to the equations (10) and (11), which describe the effect of the power P_{int} of the international NGOs on their tolerance for deviance

$$T_{int} = k_{int} + c_{int} * P_{int} = k_{int} + c_{int} * TradeDep_{2011},$$

where $k_{int} > 0$ and $c_{int} < 0$ (12)

as well as on their related constraint

$$C_{int} = E_{int} * (1 - k_{int} - c_{int} * TradeDep_{2011})$$
 (13)

Tab. 2: Parameter estimation of the international tolerance for deviance T_{int}

Sequential model	Basic exp. b_{int}	Const. k_{int}	Coeff. c_{int}	N abs.	N rel.	Adj. r-sq.
A1	1.50	0.258***	-5.07*10 ⁻⁴	162	1.000	.005
A2	1.50	0.531***	-6.27*10 ⁻⁴	63	0.389	.026
A3	1.50	0.652***	-3.07*10 ⁻⁴	31	0.191	.001
<u>A4</u>	<u>1.50</u>	<u>0.723***</u>	<u>-2.59*10⁻⁴</u>	<u>12</u>	<u>0.074</u>	<u>.147</u>
B1	2.00	0.272***	-4.67*10 ⁻⁴	169	1.000	.003
B2	2.00	0.586***	-7.40*10 ⁻⁴ *	64	0.379	.040
B3	2.00	0.744***	-6.29*10 ⁻⁴ **	28	0.166	.211
<u>B4</u>	<u>2.00</u>	<u>0.765***</u>	<u>-4.31*10⁻⁴**</u>	<u>14</u>	<u>0.083</u>	<u>.463</u>
C1	2.50	0.301***	-5.28*10 ⁻⁴	170	1.000	.004
C2	2.50	0.615***	-8.10*10 ⁻⁴ *	68	0.400	.042
C3	2.50	0.796***	-8.58*10 ⁻⁴ ***	29	0.171	.320
<u>C4</u>	<u>2.50</u>	<u>0.779***</u>	<u>-3.53*10⁻⁴**</u>	<u>18</u>	<u>0.106</u>	<u>.339</u>

Legend: Underlined: Final model for given b_{int} . Bold underlined: Best final model. One-tailed significances: ***: $p \leq .001$, **: $p \leq .01$, *: $p \leq .05$. N rel.: Relative sample size in comparison to the first model for a given b_{int} . Adj. r-sq.: Adjusted r-square = Fit of the model. Samples of the original models A1, B1, C1: Global full-samples, i.e. all countries and territories, for which Freedom House (2017) has data. Dependent variable: D_i . Restriction: $D_i \geq 0$. Independent variable: TradeDep₂₀₁₁.

As in the previous section 4, sequential linear regression was used to estimate the parameters k_{int} and c_{int} for different working hypotheses about the basic expectation b_{int} , which was systematically varied between the plausible limits $b_{int} = 0$ and $b_{int} = 3$. The best statistical results are given in Tab. 2 and show the highest values of r^2 for

the final model B4. Like in Tab. 1, the basic expectation $b_{int} = 2.00$, implying that the international NGOs expect for $F_{2011} = F_{min} = 1$ an increase of freedom to the level $F_{min} + 2 = 3$ (see eqn. (1a)). For the optimal model B4, the parameters k_{int} and c_{int} are both statistically significant and have the signs postulated in hypothesis 3, which is thus confirmed. However, the explanatory power r^2 of this model is clearly smaller than the corresponding $r^2 = 0.899$ of the power of the national civil society (see Tab. 1, model B4). This finding probably mirrors the relative weakness of the international NGOs concerned.

6. THE JOINT EFFECTS OF THE NATIONAL AND INTERNATIONAL CONSTRAINTS

With the parameter estimates of the previous Tabs. 1 and 2 it is possible to quantify the constraints

$$C_i = E_i * (1 - k_i - c_i * P_i) \quad (5)$$

which are given by the national civil society ($i=nat$) and the international NGOs ($i=int$). As mentioned earlier, the chosen F_+ must comply with *both* constraints and consequently has to fulfil the inequality

$$F_+ \geq \max(C_{nat}, C_{int}) \quad (14)$$

On the one hand, this expression allows predictions to be made about the future freedom F_+ . These predictions are less precise but more reliable and robust than the usual forecasts: the constraints which they are based on are given by the power of other interest groups. On the other hand, inequality (14) leads to the additional research question which of the two groups is more important for constraining the governmental decisions about future democratic freedom. The answer depends on the differences with regard to the power of the two groups. According to Fig. 5a, the NGOs are *generally* not strong enough to really influence governmental decisions. This confirms earlier investigations of Hufbauer et al. (2009: 159), where only 31% of all international sanctions lead to the intended regime change / democratisation. Conversely, national civil society is much more important, especially if political freedom is high. Only if the political freedom F_{2011} and the related power P_{nat} of the national civil society are very limited and trade dependency is very high, are international NGOs important enough to constrain governmental policies (see Fig. 5b). However, also in this situation the influence of the NGOs is rather weak. This result is not so unexpected, as many recent trade boycotts had only limited success.

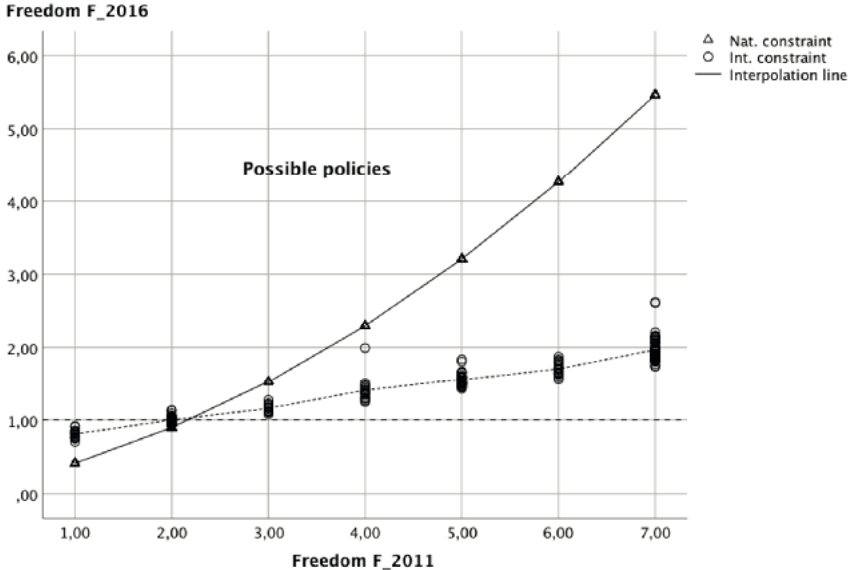


Fig. 5a: A synoptic view of the constraints C_{nat} and C_{int} of countries at all levels level of trade dependency TradeDep_2011 ⁸⁾

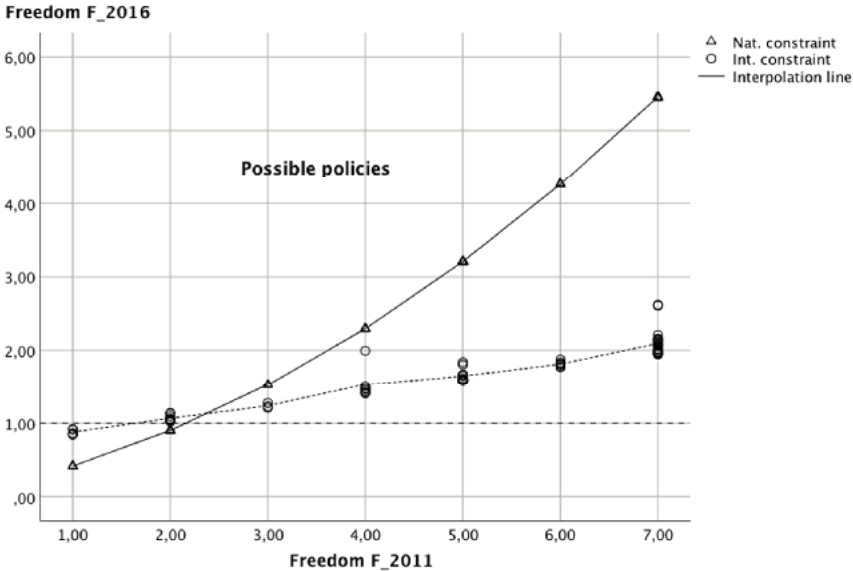


Fig. 5b: A synoptic view of the constraints C_{nat} and C_{int} of countries with high trade dependency TradeDep_2011 > 100 ⁸⁾

7. SUMMARY AND CONCLUSIONS

This article is a plea to look at *possible* instead of *real* behaviour. Sociological analysis generally focuses on the second type of behaviour, which, however, is often difficult to explain: social actors are in many situations irrational, emotional, and have unstable preferences and free will (Frank 2005; Berthoz 2006), which is often neglected in modern sociological analysis (Scheff 1992). Conversely, *impossible* behaviour constrained by the power and interests of significant others is much easier to model and has a higher reliability. *Possible* behaviour is complementary to impossible behaviour and consequently shares its analytical advantages — and also some disadvantages:

- a) *Explanations* with the presented constraint model are generally *sound and robust*: they can only fail if one supposes that significant others do not make use of their power in order to defend their own interests. Typically, regressions describing the behavioural constraints have in terms of the adjusted r^2 a higher explanatory power than conventional regression models.
- b) *Forecasts* are very *reliable*, as they typically refer to impossible scenarios. However, the complementary forecasts about possible behaviour are often *vague* and imprecise. Thus, it is important to explore all constraints, e.g. not only the lower boundaries of possible political freedom but also the upper ones, which has not been done for this article.
- c) Assessments of the *relative weights* of different constraints and their supporters are important by-products for *further analyses*. In strategic terms, such weights allow for assessment of the power gains which are necessary in order to turn less important groups into key players of the political game. In analytic terms, they help to assess the consequences from trends in the power distribution on the future importance of the concerned political actors.

This article illustrates the aforementioned advantages of analysing possible instead of real behaviour for the case of the impairment of political freedom by antidemocratic regimes. Because of the general nature of the key concepts, i.e. the power P_i of the different groups and their expectations E_i , the method of analysing constraints by sequential regressions can easily be applied to other political domains like social or welfare policy, as shown by the author in previous research (see Mueller 2003, 2006). The availability of a *sufficient* number of *appropriate* cases is, however, important for the successful use of the proposed methodology. Since the final regression equation $f_n(X)$ for the parameter estimation is calculated with ca. 10% of the original data points (see section 3), a lot of data are intentionally “wasted” so that at least 100 observations are required. Moreover, it should be plausible by the intentions of the analysed social actors that the mentioned 10% of the original values are sufficiently close to their behavioural constraints.

APPENDIX: GLOSSARY OF MATHEMATICAL TERMS

- b_i : Parameter describing the basic expectation of group i , if $F = F_{\min}$. See equation (1a).
- c_i : Parameter describing the effect of the power P_i of group i on its tolerance T_i (see equation (3)).
- C_i : Constraint of possible governmental policies, set by the power of group i .
- D_i : Rel. deviance of the governmental policy from the expectation E_i of group i .
- Δ : Difference between the current freedom F and the expectation E_i about freedom F_+ at a future point in time.
- E_i : Expectation of group i about the freedom F_+ at a future point in time.
- F : Freedom at the baseline time-point.
- F_+ : Freedom at a future point in time.
- F_{2011} : Political freedom in 2011 = Operationalisation of F and P_{nat} .
- F_{2016} : Political freedom in 2016 = Operationalisation of F_+ .
- F_{\max} : Highest possible value of F and F_+ , given by the operationalisations of F and F_+ .
- F_{\min} : Lowest possible value of F and F_+ , given by the operationalisations of F and F_+ .
- int: Group i = International NGOs for the promotion of political freedom.
- k_i : Parameter describing the effect of the power P_i of group i on its tolerance T_i (see equation (3)).
- max: Maximum.
- nat: Group i = National civil society.
- P_i : Power of group i .
- T_i : Tolerance of group i with regard to deviations from its expectation E_i .
- TradDep₂₀₁₁: Trade dependency in 2011 = Operationalization of P_{int} .

NOTES

- 1 From equation (4) follows for any F_+ on the constraint-line C_i between possible and impossible policies: $(E_i - F_+) / E_i = k_i + c_i * P_i$. Thus $(E_i - F_+) = E_i * (k_i + c_i * P_i)$ and $-(E_i - F_+) = -E_i * (k_i + c_i * P_i)$. Consequently $F_+ = E_i - E_i * (k_i + c_i * P_i) = E_i * (1 - (k_i + c_i * P_i)) = E_i * (1 - k_i - c_i * P_i) = C_i$, since F_+ was assumed to be on the constraint line C_i .
- 2 www.freedomhouse.org/report/freedom-world/freedom-world-2017 → download “FIW 2017 Data” → open folder “FIW2017_Data” → open EXCEL-file FH_Country_and_Territory_Ratings_and_Statuses_1972-2016 (accessed on March 7, 2017).
- 3 For details of the rather complex operationalisation, see the original description of Freedom House in <https://freedomhouse.org/report/methodology-freedom-world-2018>.
- 4 In terms of the iteratively reweighted least squares procedure, the observations with negative residuals are assigned the weight 0, whereas the other observations keep the original weight 1.

- 5 In classical test theory 5% is the “weakest” limiting probability for *rare* events, which is often used to reject null hypotheses.
- 6 *Fat* circular markers in this scatterplot represent *multiple* entries, i.e. several countries with identical values for F_2011 and D.
- 7 The parameters of the regression line in Fig. 4b are identical to the parameters of the model B1 in Tab. 1.
- 8 By definition $F_{2016} = 1$ is the minimum possible level of political freedom.

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