Simulating the Evolution of Global Democracy Levels[*]

Joachim Carlsen

Centre for the Study of Civil War; e-mail: joachim@prio.no

Håvard Hegre

Centre for the Study of Civil War; e-mail: hhegre@prio.no

Paper prepared for delivery at the National Political Science Conference,

3–5 January 2007, Trondheim, Norway.

January 2, 2007

Abstract

This paper presents a multivariate multinomial logit model of changes to countries' level of democracy ('Markov regression'), taking into account the stability of different institutional setups, average income, diffusion through neighborhoods, and the instability of new and inconsistent institutions. To allow interpreting the aggregate effect of these factors, the paper develops a simulation model where the political systems of a set of simulated countries evolve in accordance with the results of the multinomial logit model. The results show a strong tendency for political systems to move toward either full democracy or full autocracy, but find the diffusion effect to be relatively less strong. The simulations tend to produce less dramatic changes in the global average democracy score than what was actually observed in the real world during the past 50 years, indicating that the diffusion of democracy also goes through other channels than the ones modeled here.

1

.

1   Introduction

> *The world has a clear interest in the spread of democratic values, because stable and free nations do not breed the ideologies of murder. They encourage the peaceful pursuit of a better life. And there are hopeful signs of a desire for freedom in the Middle East. Arab intellectuals have called on Arab governments to address the "freedom gap" so their peoples can fully share in the progress of our times. Leaders in the region speak of a new Arab charter that champions internal reform, greater politics participation, economic openness, and free trade. And from Morocco to Bahrain and beyond, nations are taking genuine steps toward politics reform. A new regime in Iraq would serve as a dramatic and inspiring example of freedom for other nations in the region.*

> US President George W. Bush, Speech to the American Enterprise Institute, February 26, 2003. [http://www.aei.org/news/newsID.16197/news_detail.asp]

The above quote is often referred to as representing the Bush administration's 'democratic dominoes' theory. Leaving aside the normative issue of whether democratic institutions should be imposed by force, the issue of whether democratization really was a prime objective when the administration decided to go to war, and the practical issue of whether the present Iraqi administration will succeed in installing democratic institutions faced with the unrest, the statement has some plausibility to it: Democratic political institutions have spread over the world over the last couple of centuries, and it seems that the likelihood of democratization in one country depends on the institutional makeup of the neighboring countries. Huntington (1991) showed that democratization occurs in waves, indicating that democratization in one place increases the chances of democratization in another, and vice versa. Gleditsch (2002) shows that democratizations clearly follow geographical patterns as demonstrated in Figure 1: Democratic institutions are more likely to be introduced and become consolidated in regions where there are several other democratic countries.

But even though juxtaposing data on type of political institutions and geographical locations of countries shows a clear relationship, this alone does not allow us to assess the extent to which the Bush adminstration can rely on a 'democratic domino' effect to take place in the Middle East. Several other factors than geographic location affect the chances that countries change regime type and the likely stability of newly installed institutions: in particular, economic development, growth, the degree of consistency of political institutions, the age of
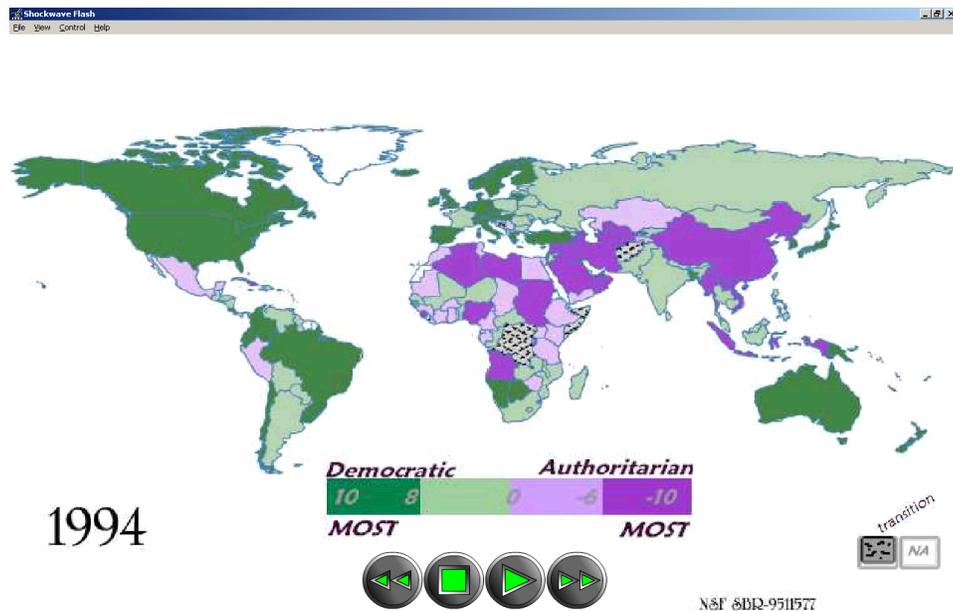
Figure 1: Geographical distribution of democracy, 1994 (Source: Ward et al., 1998)

the pre-existing institutions, the political insitutions in the country\s neighborhood, and even the neighborhood of the neighbors themselves are influential. To a large extent, these factors would work against the spread of democracy in the Middle East in the short run

Gates et al. (2004) formulate an empirical model that demonstrates how a set of relevant factors affect the probability of changes toward democracy or autocracy, in addition to the geographical diffusion effect: Inconsistent political systems – systems that combine democratic and autocratic features (e.g. South Africa under apartheid, with an elected parliament but very limited franchise) are considerably less stable than consistent ones (also see Sanhueza, 1999). Moreover, when inconsistent systems change, they seem to be most likely to change toward the consistent system with which it shares the most features, and/or toward the system predominant in the neighborhood. Regime changes are also likely to lead to further changes, such that minor movements in either direction are often followed by more changes, some of them in the opposite direction. Gates et al. (2004) also account for the importance of economic development and growth for democratic stability (Przeworski et al, 2000).

The model accounts simultaneously for multiple processes. A difficulty with such a model is that it is difficult to establish what the net effect of events is. Will the 'inspiring example' of more democratic institutions in Iraq be able to outweigh the instability created by the regime change, given the relatively unfavorable preconditions for democracy in the Middle East? The

2

answer to this question requires considering several parameter estimates simultaneously and over several years. This paper formulates a simulation procedure that allows answering this and related questions.

2 An Empirical Model of Regime Transitions

In Gates et al. (2004), we develop an empirical model of regime transitions to study the phenomenon of waves of democratization. This section presents a slightly altered version of that model. The aim of Gates et al. (2004) is to show how identifable events such as the collapse of the Soviet Union are transmitted in time and space, just as perturbations in water or in air are transmitted in waves. The model attempts to capture several mechanisms of "transmission": First, institutional changes often lead countries to unstable intermediate constellations of political institutions (Gates et al., 2006). Second, the institutional changes themselves are likely to destabilize the country, such that new changes are likely the first few years after a transition. Third, changes may encourage changes in a neighboring country.

Underlying the model is a conception of two stable institutional equilibria: An autocratic equilibrium where all power is concentrated in the hands of a few individuals, and a democratic equilibrium where power is dispersed as widely as possible (Gates et al., 2006). The model also allows studying whether states tend to adopt the same political systems as the neighborhood.

To empirically identify these mechanisms, we develop a model that relates a country's probability of having a particular regime type in one year to the regime type it had the year before, and to other variables that influence regime stability and the nature of transition. We distinguish between four different regime types: Autocracy, inconsistent autocracy, inconsistent democracy, and consistent democracy. The categorization is based on the 'Scalar Index of Polities' (SIP) developed by Gates et al. (2004; 2006). This index combines information from Polity IV on the method for selecting executives, the extent to which the exectuive is constrained by other institutions in the political system (Jaggers & Gurr, 1995), and information the extent and competitiveness of participation from Vanhanen's Polyarchy dataset (Vanhanen, 2000). Table 1 summarizes the four categories and provides some selected actual examples as of 2000, currently the last year in the dataset used here. The columns labeled 'No. of countries' report the number of countries coded for each type in the years 1950, 1975, and 2000. The column labeled 'Age' reports for each institutional type the average number of years countries had remained unchanged as of the year 2000.

Institutional Type	Ab-brev.	SIP range	No. of countries			Age in	Examples
			1950	1975	2000	2000	
Consistent Autocracy	CA	0.00–0.15	29	76	27	27.3	Cuba $1961-2000$ Eq. Guinea $1969-2000$ Libya $1969-2000$ Pakistan $1999-2000$
Inconsistent Autocracy	IA	0.15–0.35	12	15	22	9.3	Haiti $2000-2000$ Chad $1996-2000$ Egypt $1976-2000$ Bhutan $1953-2000$
Inconsistent democracy	ID	0.35–0.80	14	10	39	6.7	Mexico $1988-2000$ Nigeria $1999-2000$ Russia $1990-2000$ Malaysia $1969-2000$
Consistent Democracy	CD	0.80–1.00	27	36	68	33.7	Argentina $1983-2000$ Benin $1991-2000$ Switzerland $1872-2000$ Libya $1970-2000$ Bangladesh $1991-2000$

Table 1: The four institutional types used in analysis

We are interested in modeling under various conditions the average stability of these four institutional types, and what they tend to change into when they change. The analysis presented below builds on the concept of a transition matrix. The observed transition matrix for the $1950-2000$ period is presented in Table 2. The rows in the matrix represent the institutional type at $t-1$, the year before the year of observation. The columns represent the institutional types at the year of observation t. The right-most column and the bottom row sum over all institutional types.

The first row shows what happened to countries that were consistent autocracies (CA) at $t-1$. There were a total of 2,518 country-years of this type. Of these, $2,426$ or 96.35% remained CA. Fifty (1.99%) changed into inconsistent autocracy (IA), 28 (1.11%) into inconsistent democracy (ID), and 14 (0.56%) into consistent democracy (CD). The second row shows the same transition probabilities for countries that were IA at $t-1$.

Political systems are relatively stable, as shown in Table 1. The transition frequencies and probabilities along the diagonal of Table 2 show the probability of remaining in the same state for the four institutional types. Consistent democracies are most stable – 98.07% of the CD country-years were followed by another CD country-year in the same country. Consistent autocracies are also fairly stable, with 96.35% of the country-years remaining in the same status. The two inconsistent states are considerably less stable, with transition probabilities around 89.5%.

	Institutional Type at t				
	CA: Consistent Autocracy	IA: Inconsistent Autocracy	ID: Inconsistent Democracy	CD: Consistent Democracy	All Countries
Inst. Type at $t-1$					
Consistent Autocracy	2,426 96.35%	50 1.99%	28 1.11%	14 0.56%	2,518 100.00%
Inconsistent Autocracy	48 6.37%	675 89.64%	26 3.45%	4 0.53%	753 100.00%
Inconsistent democracy	26 3.13%	25 3.01%	743 89.52%	36 4.34%	830 100.00%
Consistent Democracy	16 0.75%	2 0.09%	23 1.08%	2,079 98.07%	2,120 100.00%
All Countries	2,156 40.44%	752 12.09%	820 13.18%	2,133 34.29%	6,221 100.00%

Table 2: Transition Matrix, four institutional types, 1950–2000

Another interesting thing to note is what the various regimes change into when they change. The majority of consistent autocracies change into inconsistent autocracies when they change, and only one out of seven change into consistent democracy. Among the inconsistent autocracies, the majority of those that change change into CA, and very few into CD. Among the inconsistent democracies, more than 40% change into consistent democracy. The few consistent democracies that change predominantly change into inconsistent democracies. These transition patterns indicate that a large group of countries oscillate between consistent and inconsistent autocracy, and another body between consistent and inconsistent democracy. A smaller body makes the transitions from the autocratic pair to the democratic pair, or vice versa. It is possible to calculate the frequency of various trajectories countries follow in their democratization process and the expected long-run distribution of types. But since the stability of the types and the transition patterns depend on other variables, we will turn to a set of covariates before addressing this issue.

2.1 'Markov Regression': The multinomial logit model

One may estimate the transition matrix using a multinomial logit model with the institutional type at t as the outcome variable, and the type at $t-1$ as a set of dummy variables. The multinomial model (see Greene, 1997: 914–917; StataCorp 2005: 210–211) for the four

outcomes ($j = 0 :$ CA, $j = 1 :$ IA, $j = 2 :$ ID, $j = 3 :$ CD) is then

$$p\left(Y_i = j\right) = \frac{e^{\boldsymbol{\beta}'_j \mathbf{x}_i}}{\displaystyle\sum_{k=1}^{4} e^{\boldsymbol{\beta}'_k \mathbf{x}_i}}$$

To identify the model, we set CA as the base outcome. The probabilities of the four outcomes are given by:

$$
\begin{aligned}
p\left(Y_i = 0\right) &= \frac{1}{1 + e^{\boldsymbol{\beta}'_1 \mathbf{x}_i} + e^{\boldsymbol{\beta}'_2 \mathbf{x}_i} + e^{\boldsymbol{\beta}'_3 \mathbf{x}_i}} \\
p\left(Y_i = 1\right) &= \frac{e^{\boldsymbol{\beta}'_1 \mathbf{x}_i}}{1 + e^{\boldsymbol{\beta}'_1 \mathbf{x}_i} + e^{\boldsymbol{\beta}'_2 \mathbf{x}_i} + e^{\boldsymbol{\beta}'_3 \mathbf{x}_i}} \\
p\left(Y_i = 2\right) &= \frac{e^{\boldsymbol{\beta}'_2 \mathbf{x}_i}}{1 + e^{\boldsymbol{\beta}'_1 \mathbf{x}_i} + e^{\boldsymbol{\beta}'_2 \mathbf{x}_i} + e^{\boldsymbol{\beta}'_3 \mathbf{x}_i}} \\
p\left(Y_i = 3\right) &= \frac{e^{\boldsymbol{\beta}'_3 \mathbf{x}_i}}{1 + e^{\boldsymbol{\beta}'_1 \mathbf{x}_i} + e^{\boldsymbol{\beta}'_2 \mathbf{x}_i} + e^{\boldsymbol{\beta}'_3 \mathbf{x}_i}}
\end{aligned}
\tag{1}
$$

The β estimates also has a direct interpretation in terms of relative probabilities:

$$\frac{p\left(Y = 1\right)}{p\left(Y = 0\right)} = e^{\boldsymbol{\beta}'_1 \mathbf{x}_i}$$

and:

$$\frac{p\left(Y = 3\right)}{p\left(Y = 0\right)} = e^{\boldsymbol{\beta}'_3 \mathbf{x}_i}$$

The estimates β_1 reported below, then, are interpreted as the impact of the explanatory variable on the probability of being inconsistent autocracy relative to consistent autocracy. The β_3 estimates approximate the probability of consistent democracy relative to consistent autocracy.

If we enter only the state at $t-1$ as explanatory variable(s), the predicted probabilities from estimating this model are identical to those reported in Table 2. The purpose of formulating this as a multinomial logit model, however, is to be able to account for a set of explanatory variables, listed in the next section.

2.2 Measuring Democracy and Democratization

Gates et al. (2006) develop a three-dimensional conception of democracy, placing each political system on axes representing the extent to which the chief executive is elected, the extent to which the executive is constrained by a parliaments or other insitutions, and the extent to

which the system allows competitive participation. Data for the executive and constraints dimensions were taken from Polity IVd (Jaggers & Gurr, 1995; McLaughlin et al., 1998), whereas data on participation was taken from Vanhanen (2000). To model what determines the direction of change, however, Gates et al. (2004) condense democracy to one dimension. We use this uni-dimensional measure of democracy (SIP) and divide into the four types presented above.

2.3 Control Variables in the Transition Model

Lagged institutional type The institutional type at $t-1$ was entered in the form of three dichotomous indicator variables: IA_{t-1}, ID_{t-1}, and CD_{t-1}. These variables have the value 1 if the country was of this type the year before, and 0 otherwise. CA is the reference category.

Consolidation It is conceivable that political systems become more stable if they succeed in getting the first few years. In particular, several scholars note that the first real election is an important step-stone for democracies. We coded a dummy variable which has the value 1 if the political system has lasted for more than five years, and 0 otherwise to capture such consolidation effects.

Share of same type in neighborhood The model includes two variables to capture the effect of the neighborhood on the transition matrix. The first variable is coded as the share of the land-contiguous neighbors that have the same institutional type as the country under observation. The variable is lagged, i.e. coded for $t-1$. Contiguity data were taken from Gleditsch (XXXX).

Difference from average type in neighborhood The second neighborhood variable is the difference between the value for the institutional type of the country under observation (either 0, 1, 2, or 3) and the average of these values for all the immediate neighbors.

Lagged GDP per capita This variable is the base-2 logarithm of constant-dollar GDP per capita.[1] The variable is lagged by one year.[2]

2.4 Estimation results

Table 3 presents the results of estimating the model. The three panels in the Table refer to the three multinomial logit equations (expression 1). CA is the reference outcome or equation. Within each of the panels, the three upper lines present the estimates for the dummy variables representing the state at $t - 1$. CA is also the reference category in this variable set. These $3x3$ estimates and the three constant terms together roughly reflect the transition matrix reported in Table 2. For the CD outcome, for example, the risk of CD relative to CA is $\exp(11.88 + 3.60 - 10.55) = 138$ if $\ln(GDP$ per capita$) = 10$, status at $t - 1$ is CD, and the other variables are zero.

The number of parameters has been reduced by constraining to 0 parameters that were clearly non-significant or lead to problems with empty cells. The constrained parameters are represented with m-dashes in the table. The consolidation variable, for instance, was constrained to 0 in the ID and CD equations. In the IA equation, the consolidation variable is significant and negative: After the five years, the probability of remaining in the same state (i.e., IA) is reduced by 46%.[3]

The effect of the neighborhood on the relative risk varies considerably over the four states. The 'share of same type in neighborhood' is not significant in the IA and ID equations and was excluded. It is positive, large and clearly significant in the CD equation. The CD/CA relative risk is $\exp(1.44) = 4.2$ times higher when all neighbors are CD as compared to when none are CD. If a country has four neighbors and one of them changes into the same type as the country, the CD/CA relative risk increases by $\exp(1.44/4) = 1.4$.

The 'difference from neighborhood' variable is positive in all three equations, but clearly

---

[1] GDP per capita data were drawn from two sources. We use World Bank data for the period 1960 to 2000 (World Bank, 2000a; 2000b) and Penn World Tables, v5.6 (Summers and Heston, 1991) for 1950 to 1959. The two datasets refer to different baseline years for calculating constant dollar figures, and are based on different methods of measurement. To counter these differences, we calculate the average ratio in the three first overlapping years per country for the overlap, and use this ratio to adjust the numbers. To reduce endogeneity bias, we lag the variable. We use the average ln(GDP per capita) for the five years preceding the end-date of each time segment. That is, for the 1990–1994 segment of a right-censored polity observation, we use the average for the years from 1989 to 1993. For a non-censored observation (e.g., an observation ending with a polity change in July 1992) we use the average for the years 1987–1991.

[2] One problem with GDP per capita as an indicator of socio-economic development is that it fails to distinguish between oil-rich countries and other high- and upper middle-income countries. This is problematic, since oil-rich countries are systematically less prone to democratize than countries with comparable average income derived from manufacturing and services (Ross, 2001).

[3] The probability of remaining in the same state is $1 - \exp(-.61) = 1 - 0.54 = 0.46$.

Equation/Variable			
CA: Consistent Autocracy	*Reference outcome*		
IA: Inconsistent Autocracy	$\widehat{\beta}$	s.e.	p-value
CA: Consistent Autocracy at $t-1$	*Reference category*		
IA: Inconsistent Autocracy at $t-1$	5.68	0.33	< 0.0005
ID: Inconsistent Democracy at $t-1$	4.17	0.51	< 0.0005
CD: Consistent Democracy at $t-1$	3.25	0.96	0.001
Consolidation: > 5 years in status	-0.61	0.24	0.011
Share of same type in neighborhood$_{t-1}$	—	—	—
Difference from average type in neighborhood$_{t-1}$	0.22	0.19	0.26
$\log_2 (GDP$ per capita)	—	—	—
Constant	-3.63	0.25	< 0.0005
ID: Inconsistent Democracy	$\widehat{\beta}$	s.e.	p-value
CA: Consistent Autocracy at $t-1$	*Reference category*		
IA: Inconsistent Autocracy at $t-1$	4.19	0.50	< 0.0005
ID: Inconsistent Democracy at $t-1$	9.04	0.50	< 0.0005
CD: Consistent Democracy at $t-1$	6.69	0.76	< 0.0005
Consolidation: > 5 years in status	—	—	—
Share of same type in neighborhood$_{t-1}$	—	—	—
Difference from average type in neighborhood$_{t-1}$	0.47	0.20	0.021
$\log_2 (GDP$ per capita)	0.11	0.083	0.167
Constant	-6.20	0.85	< 0.0005
CD: Consistent Democracy	$\widehat{\beta}$	s.e.	p-value
CA: Consistent Autocracy at $t-1$	*Reference category*		
IA: Inconsistent Autocracy at $t-1$	—	—	—
ID: Inconsistent Democracy at $t-1$	6.89	0.62	< 0.0005
CD: Consistent Democracy at $t-1$	11.88	0.82	< 0.0005
Consolidation: > 5 years in status	—	—	—
Share of same type in neighborhood$_{t-1}$	1.44	0.51	0.005
Difference from average type in neighborhood$_{t-1}$	0.54	0.24	0.021
$\log_2 (GDP$ per capita)	0.36	0.097	< 0.0005
Constant	-10.55	1.08	< 0.0005
LL model	-733.25		
No. of observations	4238		
LL null model	-4752.52		
Pseudo R^2	0.8457		

Table 3: Multinomial logit regression estimates for probability distribution for institutional types, 1950–2000

strongest for the two democratic outcomes. If the difference to the neighborhood is 1 (e.g. if the country is IA and all neighbors are ID), the CD/CA relative risk is $\exp(.47) = 1.6$ times higher than if the difference is 0.

Finally, the GDP per capita variable is clearly significant only for the CD outcome. The CD/CA relative risk increases by a factor of $\exp(0.36) = 1.4$ when GDP per capita is doubled.

2.5 Aggregate effects?

The aggregate effects of these estimates are difficult to read out of the estimates alone. Using the mathematical theory for Markov chains, we may calculate the long-run behavior of the transition matrix for a given, fixed set of values for the explanatory variables. But this requires us to assume that the transition probabilities are constant. This is impossible when neighborhood variables play an important role – a transition in one country affects the transition probabilities in the neighboring countries, and may lead to domino effects beyond the neighborhood.

We started the paper with the Bush administration's 'democratic dominoes' theory. Let us assume that a CD miraculously emerge in Iraq resulting from the intervention. There are several relevant questions this would raise, e.g.:

For how long will Iraq remain democratic? If we assume that nothing happens in the neighboring countries and disregard economic growth, we may calculate the expected duration of the Iraqi democracy from Table 3. But if the domino effect is sufficiently strong, the stability of Iraqi institutions may increase as the neighborhood becomes more democratic. The effect of the intervention on Iraq itself works not only through the change in institutional types, but also through the effect on Iraq's neighbors.

How long will it take for Iraq to become stably democratic with or without intervention? As long as there is steady economic growth, the results in Table 3 indicate that Iraq eventually will become stably democratic. To what extent will the intervention change the time it takes before this is reached?

What is the effect of the intervention on the distribution of types in the neighborhood? To assess the democratic dominoes hypothesis, we must evaluate what the likely consequences of the intervention are for Iraq's neighbors. This, however, is a function of all the 19 estimates in Table 3. As long as Iraq remains democratic, the intervention will increase

10

the probability of democratization in the neighboring countries. If the democratic regime in Iraq is very short-lived, the impact will not be large, however. In addition, the long-run effect of secondary democratization in the neighborhood will depend on the chances for stable democratic regimes in the neighboring countries. These probabilities, again, depend on GDP per capita, the neighborhood variables, and the 'consolidation term'.

What is the effect if IA or ID results from the intervention? Consistent democracy is not a likely outcome of the intervention in Iraq. What is the impact of the intervention if it rather results in an IA or ID ?

2.6 The case for simulation

Clearly, these questions require that we both investigate how all the coefficients jointly affect the the transition probabilities, and take into account the long-run impact of these changes in transition probabilities. To do this, it is necessary to run simulations. Below, we present a simulation routine that allows answering the questions above. The simulation routine starts at the year of intervention, calculates the transition probabilities, draws an outcome based on these probabilities, updates the explanatory variables, recalculates the transition probabilities for the next year, and repeats for several years into the future. To reduce the impact of individual draws, this procedure is repeated a large number of times.

3 Simulation setup

We ran 1000 simulations of a world where the probabilities of regime change are governed by the results presented in Table 3. The simulation procedure is described below. In half of the simulations, we changed the democracy score of one country – Iraq – to the maximum democracy level.

3.1 Initial States and Growth Scenarios

The initial state for the simulation is the world as of the last year of our dataset, currently the year 2000. We will refer to this year as t_0. All countries with data for all variables for this year were included in the simulation. For the first year of the simulation, we calculated the values for the variables included in Table 3. Except for GDP per capita, these variables endogenous – they are all functions of regime type at t_0, the neighborhood, and time. The only

exogenous variable is GDP per capita. We simulate two different scenarios for this variable. In one, we assume that all countries grow at the average global growth rate from 1990 to 2000; approximately 2% annually.[4] In the second scenario we allow countries to have different growth rates. We calculated the average growth rate for each country for the 1990–2000 period, and chose the midpoint between this rate and the global rate as the simulated growth rate for each country. The midpoint rate corrects somewhat for temporarily extreme growth rates, while still differentiating between fast and slow growers. China, for instance, that grew at a log rate of 0.124 in the 1990s, is simulated to grow at 0.072 (approximately 7%). Sierra Leone, with a negative growth at −0.095, has a negative growth of −0.037 in this scenario.

3.2 Simulating regime transition

The regime transitions were simulated for a period of 50 years. For each year for each country, we calculated the transition probabilities as a function of the state at t and the other covariates using the formula given in Equation (1). The program then draws the realization of these probabilities, using a random number generator. Assume for a moment that the estimated transition probabilities at t for a country are similar to those given in Table 2. If the country is a CA, the program determines that the regime type at $t+1$ is CA in 96.35% of the draws, IA in 1.99%, ID in 1.11%, and CD in 0.56%.

After having drawn the regime type at $t+1$, the program updates the variables depending on this for the focal country and for the other countries in the system: 'Share of same type in neighborhood', 'Difference from average type in neighborhood', and 'Consolidation'. Income was updated by adding the simulated growth rate.

3.3 Interventions

We ran two sets of simulations, one with intervention and one without.[5] In one set, Iraq was set to 0.9 in t_1. In the other, all regime transitions were determined stochastically as explained above.

---

[4]More precisely, the log growth rate is 0.0207.

[5]In the next version of the paper we will add two other sets, allowing different growth rates for individual countries.

4   Simulation Results

Figure 4 shows the simulated global distribution of regime types for 50 years of simulation. The x-axis represents time. The black shaded area corresponds to the average proportion of consistent autocracies (CA) for each year across the 500 simulations without intervention. The lightest grey shade corresponds to the proportion of consistent democracies (CD), and the other two shades to IA and ID. The distribution in 2000 is similar to the observed distribution for the 143 countries with data. In that year, roughly 12% of the countries were CA, another 12% IA, 30% ID, and the remaining 45% CD. According to the simulation, the proportion of countries that are CA will increase and stabilize around 25%. The proportion that are democratic will increase slightly to approach 50%, and the proportion of countries that are inconsistent will decrease.

Figure 4 reflects that there is relatively little variation in regime types. Table 2 showed that 96% of all CA country-years were followed by another CA country-year. Moreover, the only exogenous variable in the model, $\ln(GDP$ per capita$)$, has a fairly limited ability to predict variation over time. We assume that all countries grow at 2% annually. Over 50 years, $\ln(GDP$ per capita$)$ increases by 1.00, and the probability of being CD relative to CA increase with only 43%. This is not much relative to the cross-national variation in average income.

The proportion changes most quickly in the first 10-15 years. This is mostly because a large number of countries were IA and ID in 2000. According to our model, these states are very unstable. The global distribution of regime types is not in line with the equilibrium implied by the transition matrix showed in Table 2. The transition patterns we find in the historical data implies that a large number of these inconsistent regimes will revert to CA. The slow increase in the number of democracies, on the other hand, seems to be mostly due to the increase in average income levels.
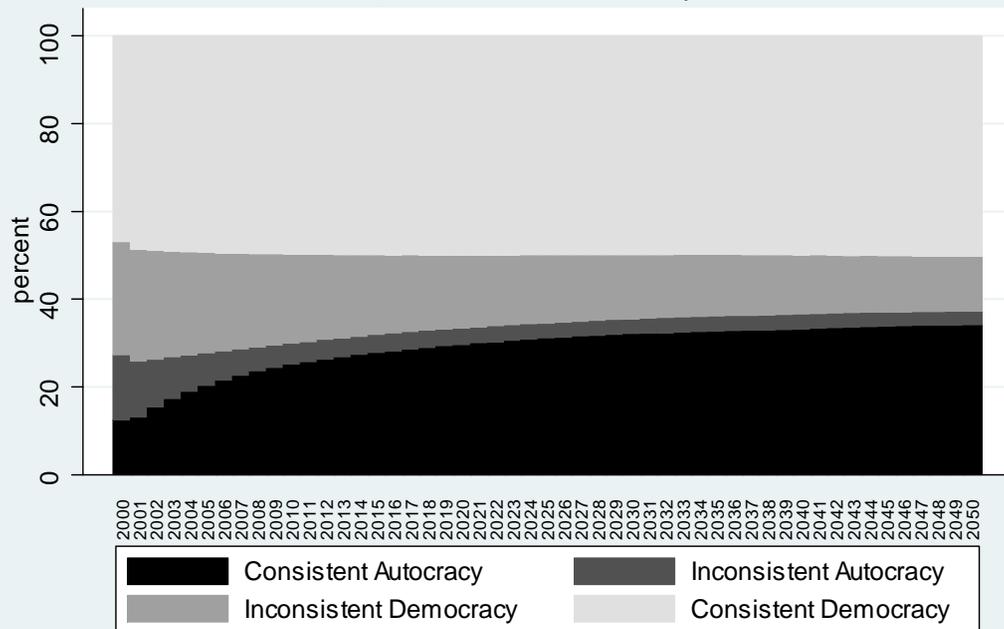
Figure 4 shows the same development in the regime type distribution for the simulations with intervention in Iraq in 2001. The impact on the global distribution is barely discernible. The share of countries that are CA decrease somewhat slower than in Figure 4, but the distribution in 2050 is not very different.
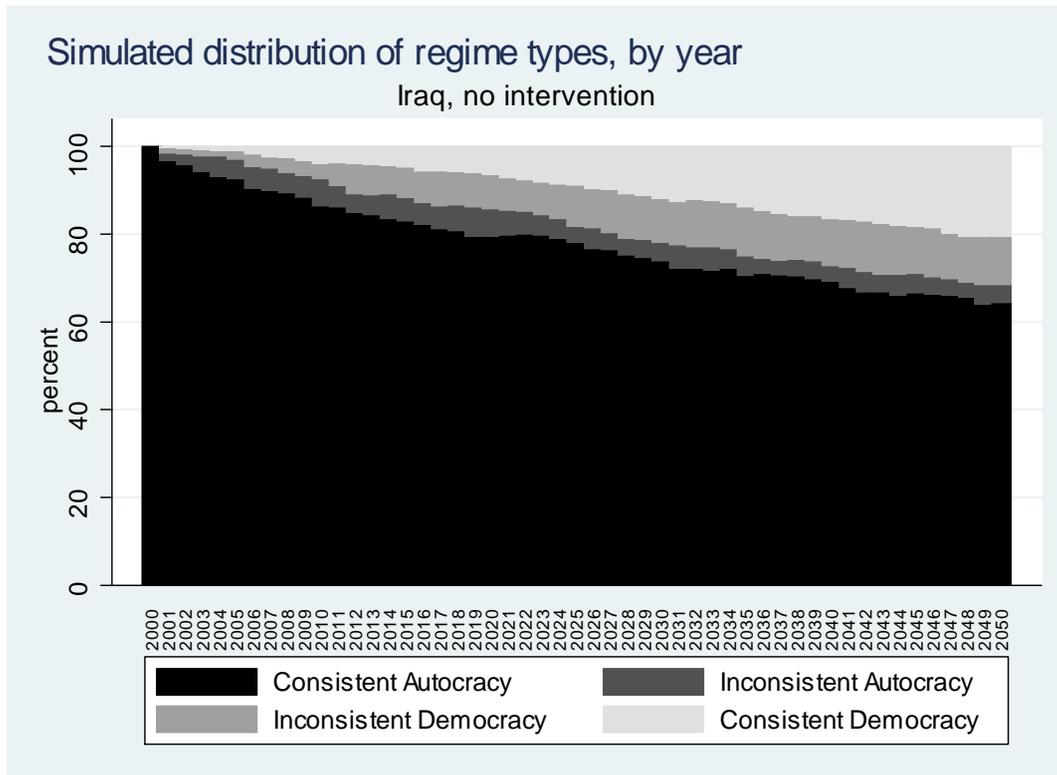
Figure 4 shows the simulated development in Iraq without intervention. Since Iraq was CA in 2000, 100% of the simulations had Iraq as CA that year. As time passes, Iraq is CA in a decreasing proportion of the simulations. In 2050, Iraq is CD is roughly 18% of the runs,

Simulated distribution of regime types, by year

All countries, no intervention
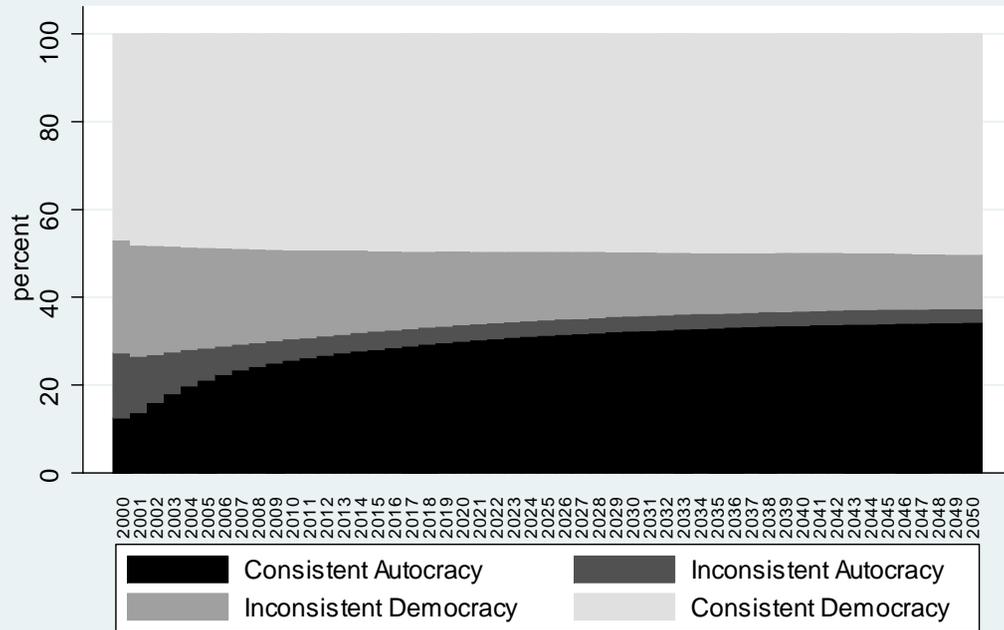
Simulated distribution of regime types, by year

All countries, with intervention in Iraq

Simulated distribution of regime types, by year

Iraq, no intervention

and ID in another 7-8%.

Figure 4 shows the corresponding development for Iraq with intervention in 2001. In 2001, all simulation runs have Iraq as CD. This proportion decreases steadily until it reaches 25% about 2040.

Although Figure 4 indicate little impact on the global distribution of regime types, there might be a visible impact on Iraq's immediate neighborhood. Figure 4 shows the simulated development in the Middle East except Iraq.[6] Without intervention in Iraq, the proportion of countries that are CD increases from about 25% to almost 50%, and the proportion that are CA remains stable at just under 38%.

Figure 4 shows the same development for the simulations where we set Iraq to be CD in 2001. There is no discernible domino effect here. In fact, a slightly lower share of the countries are CD in 2050 in the intervention runs than in the non-intervention runs.

Figures 4 and 4 show how intervention is estimated to affect Iraq's most immediate neighbor, Iran. As for the rest of the region, the impact is extremely slight. The probability that Iran transitions into an ID or a CD is somewhat larger in the years immediately after the intervention. Approximately 25 years after the intervention, however, these differences have

---

[6]We define the Middle East here to comprise Turkey, Iran, Jordan, Syria, Lebanon, Israel, Saudi Arabia, Kuwait, Qatar, and Bahrain.

Simulated distribution of regime types, by year
Iraq, with intervention
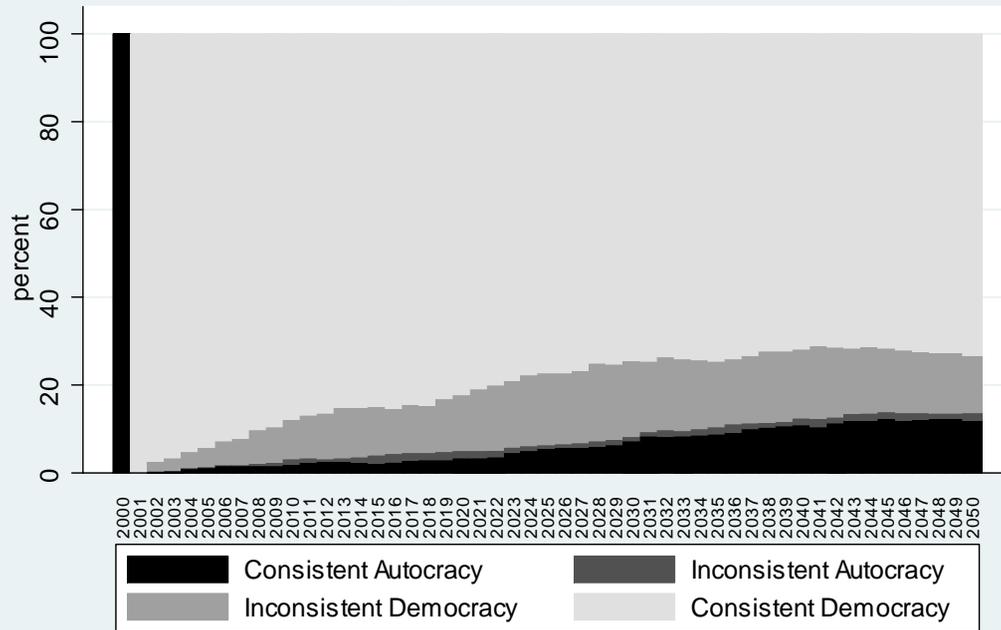
Simulated distribution of regime types, by year
Middle East countries except Iraq, no intervention

Simulated distribution of regime types, by year

Middle East countries except Iraq, with intervention in Iraq
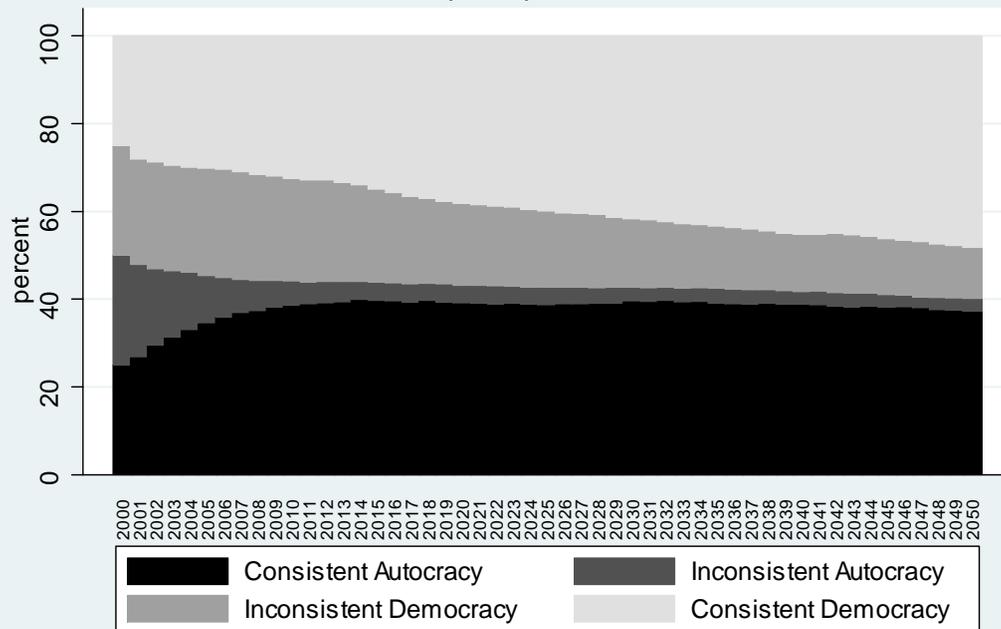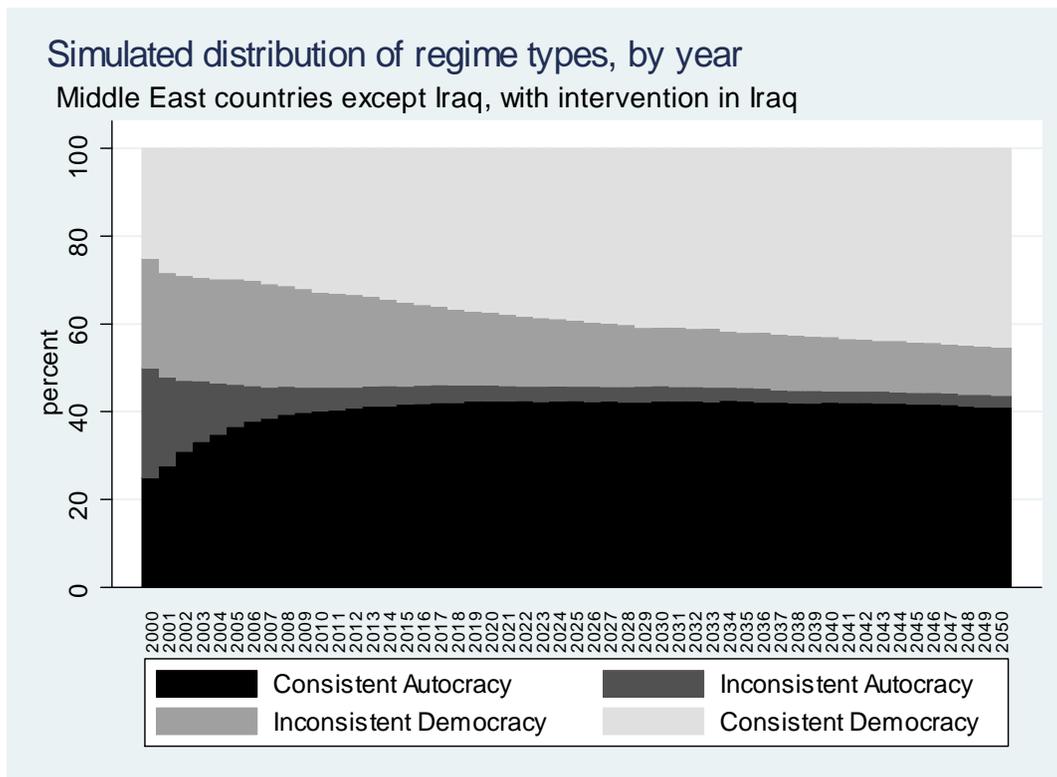
evaporated and the proportion of simulations where Iran is CED in 2050 is lower in the intervention cases than in the non-intervention cases. This is probably simply due to random chance, and the difference would possibly disappear if we ran a higher number of simulations.

Finally, Figure 4 shows the simulated development of political institutions in China. Bearing in mind that the simulation in this case makes a very conservative assumption regarding growth (2% as compared to the 10-12% by which China grew in the 1990s), the picture is one of stability. China is democratic in 2050 in only 23% of the simulations.
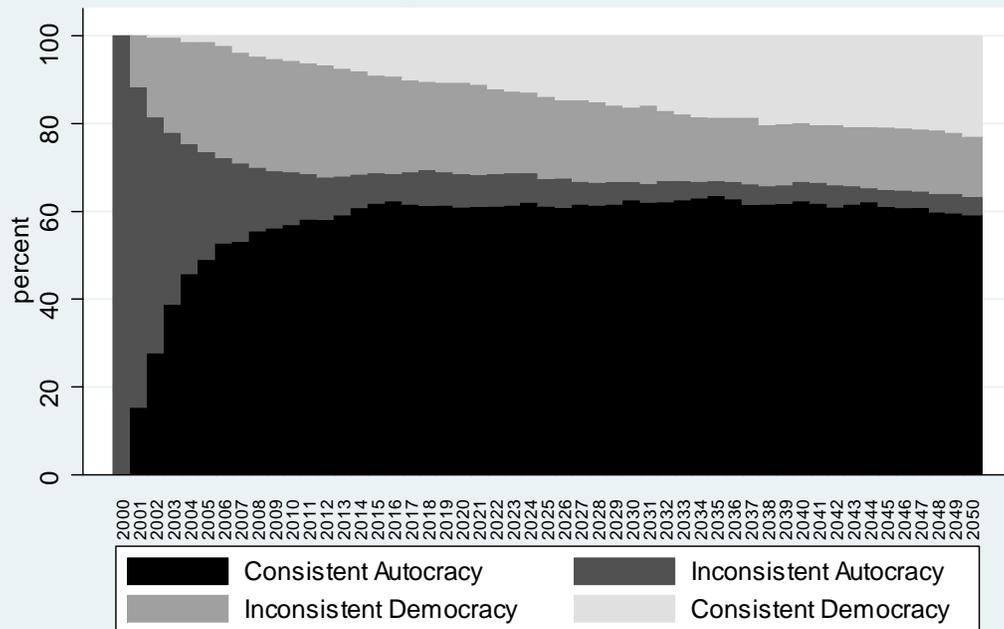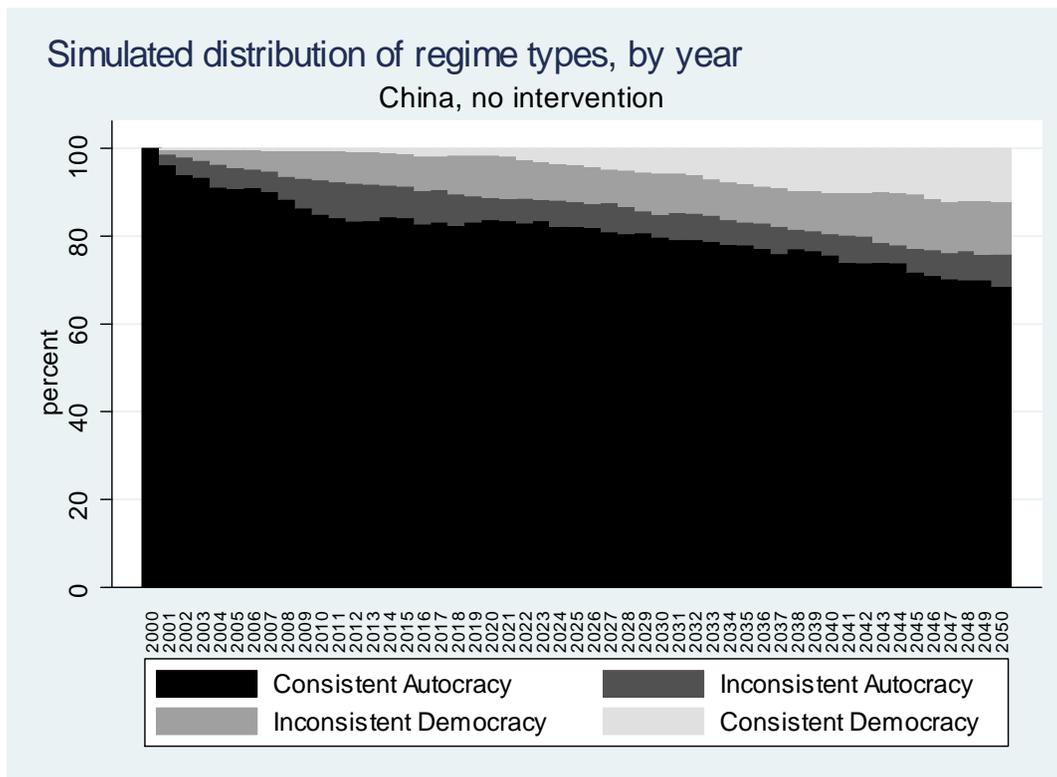
5   Discussion

The results of the simulation show a strong tendency for political systems to move toward either full democracy or full autocracy, confirming the results and conclusions in Gates et al. (2004, 2006). Although the diffusion effects are equally statistically significant, they are of substantively much less importance: changes to full democracy are found to have fairly long-lasting effects in the country that changes, but the effect on the neighborhood beyond that is very marginal. This conclusion is reinforced by noting that the intervention considered leads to the most consistent and most stable type of democracy. In the real world, democratization processes often go through more gradual changes and are more prone to setbacks than the

Simulated distribution of regime types, by year
Iran, no intervention

Legend:
- Consistent Autocracy
- Inconsistent Autocracy
- Inconsistent Democracy
- Consistent Democracy
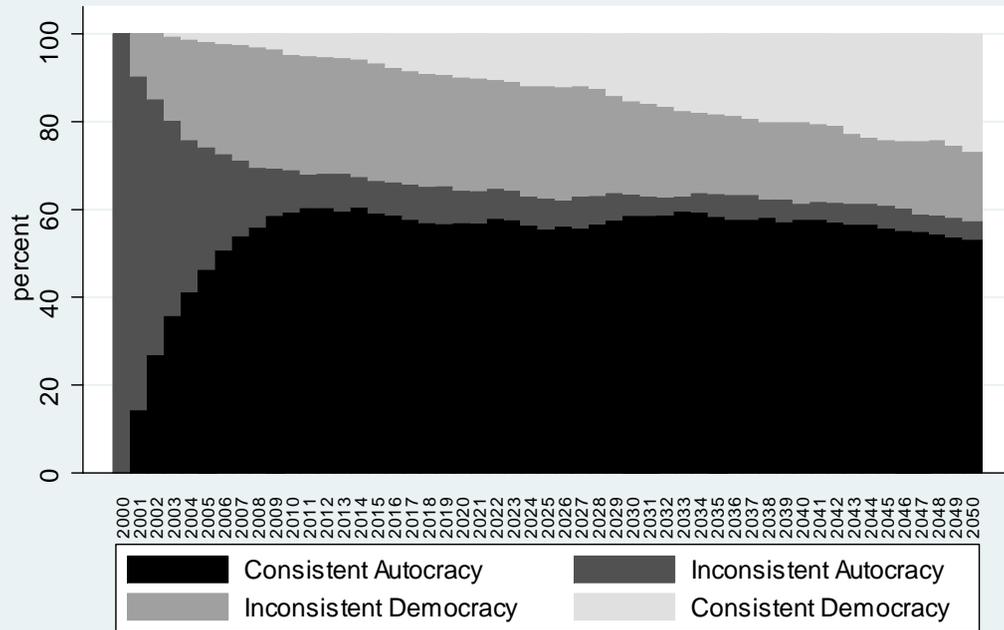
Simulated distribution of regime types, by year
Iran, with intervention

Legend:
- Consistent Autocracy
- Inconsistent Autocracy
- Inconsistent Democracy
- Consistent Democracy

Simulated distribution of regime types, by year

China, no intervention

intervention considered here. Moreover, recent events in Iraq indicates that even an inconsistent democracy is a very optimistic predicted outcome the day that US forces withdraw from the country.

The pseudo-R^2 (the log likelihood ratio index) is as high as 0.85 in the model presented in Table 3. The model seemingly does a good job in explaining the regime type of countries. However, most of the explanatory power lies in the variables representing the previous state of the country. Our model only performs marginally better than saying that 'a country's regime type next year is the same as it has this year'. Most of what determines *change* is not accounted for by the model. Correspondingly, the simulations tend to underestimate the forces that alter global democracy levels. Figure 4 does not predict a dramatic pattern of democratization – there is no fourth wave of democratization emerging in our simulations. In the real world, average income and neighborhood effects clearly affect a country's transition patterns, but the widespread democratization seen after World War II is to a large extent explained by factors not included in our model. Gates (2004) shows that the world wars and the collapse of the Soviet Union are important explanations of Huntington's three waves. These are largely one-off events from which it is hard to draw any systematic patterns. They were similar in the sense that they directly affected a large number of countries – the impact was not transmitted through thidr countries. Our results probably reflect the same, that

large-scale changes in democracy levels only marginally depend on a gradual diffusion of democracy.

The simulation currently disregards the fact that countries' economic growth rates differ widely, and that they are likely to be spatially correlated. Given the strong relationship between growth, development, and the emergence and consolidiation of democratic political systems, accounting for the diffusion of the underlying economic conditions is likely to show a stronger geographical diffusion of democracy. In fact, the relatively weak neighborhood effects shown in the simulation results in the absence of an economic diffusion model indicates that such diffusion – or diffusion of other preconditions of democracy – has great explanatory power.

In conclusion, the Bush administration should not have too much faith in Iraq as a 'dramatic and inspiring example of freedom', even if Iraq turns out to become a stable democracy.

6 References

Beck, Nathaniel; Jonathan N. Katz & Richard Tucker, 1998. 'Taking Time Seriously: Time-Series-Cross-Section Analysis with a Binary Dependent Variable'. *American Journal of Political Science* 42(4):1260–88.

Gates, Scott; Håvard Hegre, Mark P. Jones & Håvard Strand, 2006. 'Institutional Inconsistency and Political Instability: Polity Duration, 1800-2000', *American Journal of Political Science* 50(4): 893–908.

Gates, Scott; Håvard Hegre, Mark Jones & Håvard Strand, 2004. 'Democratic Waves? War, New States, and Global Patterns of Democracy, 1800–2000'. Paper presented at the University of Iowa.

Gleditsch, Kristian S., 2002. *All International Politics is Local. The Diffusion of Conflict, Integration, and Democratization* . Ann Arbor, MI: Michigan University Press.

Huntington, Samuel P., 1991. *The Third Wave: Democratization in the Late Twentieth Century.* Norman, OK & London: University of Oklahoma Press.

Jaggers, Keith & Ted Robert Gurr, 1995. 'Tracking Democracy´s Third Wave with the Polity III Data', *Journal of Peace Research* 32(4): 469-482.

McLaughlin, Sara, Scott Gates, Håvard Hegre, Ranveig Gissinger & Nils Petter Gleditsch, 1998. 'Timing the Changes in Political Structures: A New Polity Database', *Journal of*

Conflict Resolution 42(2): 231-242.

Maddison, Angus, 1995. *Monitoring the World Economy 1820-1992.* Paris: Development Centre of the Organization for Economic Co-Operation and Development.Mooney, Christopher Z., 1997. *Monte Carlo Simulation.* QASS no. 116. Thousand Oaks, CA, etc.: Sage.

Przeworski, Adam; Michael E. Alvarez, José Antonio Cheibub, and Fernando Limongi., 2000. *Democracy and Development. Political Institutions and Well-Being in the World, 1950-1990.* Cambridge: Cambridge University Press.

Raknerud, Arvid & Håvard Hegre, 1997. 'The Hazard of War. Reassessing the Evidence for the Democratic Peace'. *Journal of Peace Research* 34(4):385–404.

Ross, Michael, 2001. 'Does Oil Hinder Democracy?', *World Politics* 53(April):325–61.

Sanhueza, Ricardo, 1999. 'The Hazard Rate of Political Regimes', *Public Choice* 98: 337–367.

Summers, Robert & Alan Heston, 1991. 'The Penn World Table (Mark 5): An Expanded Set of International Comparisons, 1950-1988', *Quarterly Journal of Economics* 106(2): 327–368. [Version 5.6 of the data, released January 1995, available at http://datacentre.chass.utoronto.ca/pwt/.].

Ward, Michael D.; John O'Loughlin, Jordin S. Cohen, Kristian S. Gleditsch, David S. Brown, David A. Reilly, Corey L. Lofdahl, & Michael E. Shin, 1998. "The Diffusion of Democracy, 1946-1994," *Annals of the Association of American Geographers* 88: 545-574. Figure downloaded from http://weber.ucsd.edu/~kgledits/vita.html.

World Bank, 2000a. *World Development Indicators 2000.* Washington, DC: Development Data Center, International Bank for Reconstruction and Development.

World Bank, 2000b. *World Development Indicators on CD-ROM.* Washington, DC: Development Data Center, International Bank for Reconstruction and Development.