Institutions and Conflict Resolution Dealing with Endogeneity[*]

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Abstract

Increasingly scholars and practitioners put hope into power-sharing institutions like federalism, decentralization and consociationalism to solve ethnic conflicts or civil wars. Both the theoretical and empirical underpinnings for such hopes are, however, quite weak. Empirical work looking at how institutions affect the onset and resolution of civil wars, or the rebellious nature of "minorities at risk" starts most often with the implicit assumption that institutions are exogenous. With respect to most institutions of power-sharing and the type of analysis that interests us, such an assumption is tenuous. In this paper I discuss in detail the problems related to the endogenous nature of institutions and provide empirical illustrations of how established empirical results are affected when taking the endogeneity problem into account.

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1   Introduction

After a long spell of work on civil wars and societal conflict[1] focusing on the dichotomy of "greed" and "grievances" (most prominently Collier and Hoeffler, 2001)[2] an increasing number of studies focus on the effect of political institutions (e.g., Mansfield and Snyder, 1995; Cohen, 1997; Hegre, Ellingsen, Gates and Gleditsch, 2001; Reynal-Querol, 2002*a*; Reynal-Querol, 2002*b*; Montalvo and Reynal-Querol, 2003; Reynal-Querol, 2005). This focus on political institutions is obviously driven in part by policy questions, since, as Belmont, Mainwaring and Reynolds (2002, 2) convincingly argue:

> [i]n contrast [to most other factors influencing conflict], political institutions can be altered to increase the likelihood of managing conflict democratically.

Thus, for policy-makers institutions seem one of the more promising levers to alleviate societal conflicts and pacify civil war situations. Not surprisingly then, many political scientists are happy to engage in "institutional engineering" by proposing particular types of institutions to mitigate conflictual situations.[3] Compared to economists engaging in a similar trade[4] political scientists often base insights on inductive generalizations. The danger of such generalizations is that often the origins of institututions studied are not elucidated. For example, when assessing the effect of federal arrangements on conflict resolution, it is very likely that the presence of such arrangements is not stranger to the existence of conflict (e.g., Christin and Hug, 2004). Neglecting such problems of endogeneity makes institutional engineering a much more problematic and difficult trade, as

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[1] I will eschew any definitional debate on these terms by simply referring to work by Kalyvas (2001), Gates and Strand (2004), and Sambanis (2004) for definitions of civil wars and to work by Fearon and Laitin (1997), Hug (2003), Kalyvas (2003) and Fearon (2005*a*) on identifying groups possibly engaging in conflictual behavior and measuring conflict.

[2] The role of primary ressources plays a central role in this debate as recent contributions to a special issue of the *Journal of Conflict Resolution* demonstrates (Collier and Hoeffler, 2005; Dunning, 2005; Fearon, 2005*b*; Humphreys, 2005; Lujala, Gleditsch and Gilmore, 2005; Snyder and Bhavnani, 2005; Weinstein, 2005).

[3] The collection of articles in Reynolds (2002) illustrates this tendency nicely.

[4] Feld and Hug (2005 forthcoming) compare the ways in which economists and political scientists engage in constitutional engineering in general and with respect to the European Union constitutional treaty in particular.

Przeworski (2004) forecfully and convincingly argues.[5]

In empirical studies, however, few authors directly address the problem of endogenous institutions when addressing the effect the latter have on societal conflicts and civil wars (with the notable exceptions of Sambanis, 2000; Elbadawi and Sambanis, 2002; Brancati, 2005; Reynal-Querol, 2005; Schneider and Wiesehomeier, 2005).[6] Thus, many claims appearing in the literature on the effects of political institutions on societal conflicts and civil wars have to be taken with a large grain of salt.

In this paper I wish to highlight these problems of endogenous political institutions in a systematic fashion and discuss empirical models allowing to alleviate some of the inferential problems. To do this I first discuss some of the basic arguments in the literature on the effect of institutions on societal conflict. In section three I show both at the substantive and empirical level that institutions in most empirical studies are very unlikely to be exogenous to the phenonmenon studied. I discuss the few studies that have addressed the issue of endogeneity directly in conflict studies and evaluate the estimation procedures employed and discuss some shortcomings. In section four I suggest, based on work carried out in other areas, additional measures to be taken in the face of endogenity problems. I illustrate these additional measures by reanalyzing a partial dataset from Cohen's (1997) study on the effect of federalism and proportional representation on "minorities at riks." Section five concludes.

2 Institutions and societal conflict

In studies on societal conflicts and civil war political institutions may play an important role in two research questions. First of all, what (including political institution) may keep a lid on societal conflicts or least dampen them and keeping them non-violent? Second, which institutions may pacify conflicts that have escalated? While one might presume that the answers to the two questions are largely identical, much recent research on peace-settlements and peacekeeping suggests otherwise (e.g., Walter, 1997; Gilligan and Stedman, 2001; Walter, 2002;

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[5]In the context of conflict research Wagner (2000, 2004) makes this claim probably in a similarly convicining fashion.

[6]As we will see in what follows, not all of these studies address the problem of endogeneity with the necessary care.

Fortna, 2004). Clearly, however, political institutions appear in both sets of answers.[7]

When it comes to keeping societal conflicts non-violent and civil wars from breaking out, many institutions are proposed as useful tools by scholars.[8] Researchers on social movements suggest that the openess of a political system decreases the degree of violence in demonstrations (e.g., Kriesi, Koopmans, Duyvendak and Giugni, 1995). Similarly, proponents of consociational or consensus-oriented democracy suggest that such power-sharing arrangements reduce the likelihood of violence (e.g., Lijphart, 1999; Lijphart, 2004). Scholars assessing these claims empirically, like (Reynal-Querol, 2002a, 2005), suggest that inclusive political systems reduce the likelihood of civil wars.[9] Interestingly Norris (2002) finds that ethnic minorities are not happier in consociational countries with their inclusion than in other democracies.

Similar pacifying effects are attributed to federal arrangements, decentralization and regional autonomy (e.g., Cohen, 1997; Lake and Rothchild, 1999; Gurr, 2000).[10] This view is, however, also contested (e.g., Lake and Rothchild, 2004 forthcoming) or rendered more nuanced (e.g., Ghai, 2002; McGarry and O'Leary, 2003; McGarry, 2004; Brancati, 2005). Ghai (2002), for instance, highlights the tension federalism and regional autonomy create for liberal democarcy. McGarry and O'Leary (2003) and McGarry (2004) argue that federalism alone does not suffice to pacify a conflict situation, but that such an arrangement combined with consociationalism will do the trick. Brancati (2005), on the other hand, argues that only federal arrangements making regional parties weak or unlikely to emerge can contribute to mitigating societal conflicts.

The empirical picture in systematic studies is mixed. While Cohen (1997) reports that federalism reduces rebellious behaviour by "minorities at risk," he also finds that the amount of non-violent protest is higher in federal systems. Christin and Hug (2003), addressing the issue of potential selection bias in the

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[7]Horowitz (2002) as well as Lijphart (2002) offer general discussions of the role political institutons play in conflict-management.

[8]In what follows I refrain from addressing the second question, namely what political institutions may be especially helpful in pacifying ongoing conflicts.

[9]Christin and Hug (2004) find that the inclusiveness is largely an endogenous variable, making the claims by Reynal-Querol (2002a) somewhat suspect.

[10]Rodden (2004) alerts us, however, that often simple classifications of federal systems are hardly adequate (see also Rodden and Wibbels, 2002).

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"minorities at risk" (MAR) dataset used by Cohen (1997),[11] cannot replicate this positive result for federal arrangements. Brancati (2005), complementing the MAR dataset with additional information, finds that federalism reduces conflict as long as no regional parties appear.

Another institution often related to possible conflict mitigation is a proportional representation electoral system.[12] As part of consensus democracy proportional representation obivously also finds a defendant in Lijphart (1999, 2004), but also in Cohen (1997) and Reynal-Querol (2002a).[13] Interestingly, several scholars also take quite opposing positions to this stance. Roeder (2003) suggests that majoritarian institutions are more likely to foster peace, while Horowitz (1985) advocates the use of the "alternative vote" as electoral system. This later position is attacked by both Fraenkel and Grofman (2004) and Lijphart (2004), only to be reaffirmed by Horowitz (2004). At the empirical level the findings seem to support the view that proportional representation is preferrable. Both Cohen (1997) and Reynal-Querol (2002a) find that proportional representation reduces societal conflicts and makes civil war less likely.[14]

All the institutions discussed so far, with the possible exception of federalism, presuppose the existence of a democratic regime. Hence, the question appears naturally what democratic government contributes to the resolution of conflicts and the avoidance of civil wars. While democracies in general seem to be more accommodating when faced with societal conflicts (e.g., Walter, 2006 forthcoming), the effect of democracy on the onset of civil wars is largely disputed. While Mansfield and Snyder (1995) suggest that democratization may actually increase

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[11]Hug (2003) also reports evidence for selection bias problems in the MAR dataset in a replication of Gurr and Moore (1997).

[12]Together with the political institutions discussed above these cover almost completely the institutions referred to Belmont, Mainwaring and Reynolds (2002, 5f). These authors suggest that presidentialism, decentralization and federalism, and electoral systems are the three main elements for institutional engineers to work with. Interestingly, at least to my knowledge, there are almost no systematic empirical studies linking presidentialism to societal conflict and civil wars. A lone exception is Schneider and Wiesehomeier's (2005) study, which finds a positive effect of presidentialism on the onset of civil wars in an event history model. Given the rarity of such studies I will refrain from discussing the potential endogenous nature of presidentialism in studies on societal conflict and civil wars.

[13]While Reynal-Querol (2002a) is one of the only researchers to propose a theoretical model as underpinning for her claims on the effect of proportional representation, her assumptions employed in the model may strike more than one reader as problematic.

[14]Surprisingly, Christin and Hug (2004) fail to find any evidence of endogeneity for the electoral system in Reynal-Querol's (2002a) analysis.

the likelihood of both inter- and intrastate wars, their claims have been vigorously disputed by Enterline (1996) and Thompson and Tucker (1997) among others. Hegre, Ellingsen, Gates and Gleditsch (2001) find, however, a curvilinear relationship between the level of democracy and the probability of a civil war onset. This curvilinear relationship takes the shape of an inverted U-curve, suggesting that countries partially democratized are most likely to become embroiled in a civil war.

3 Endogeneity

As discussed above, political institutions appear for good resons with increasing frequency among the set of explanatory variables for societal conflicts and civil wars. While their explanatory power is certainly not disputed here, the question has to be asked in what causal relationship they stand with the phenomenon to be explained. Given that the research on societal conflicts and civil wars does not exactly excel in theoretical rigor, the causal paths in which political institutions appear are, to say the least, mostly undertheorized. Generally, the implied empirical models looking at the effect of political institutions have the following general form:[15]

$$conflict \quad = \quad f(institutions, economics, geography, population) \qquad (1)$$

Equation 2 more formally would look as follows in matrix notation:

$$Y \quad = \quad X_1\beta_1 + X_2\beta_2 + \epsilon \qquad (2)$$

where Y would be the dependent variable (either a continuous measure of conflict or a latent variable used in a non-linear model), the vector X_2 a measure for a particular institution, and the matrix X_2 contains information on the remaining explanatory variables for conflict. Given our interest in political institutions, we know that several authors have proposed empirical models of the following type:

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[15]For simplicity I omit any concerns about time sequence, etc. Thus, the observations might correspond to countries observed over a certain period (e.g., five years as in some of the studies cited in this paper) and variables would reflect averages (or some other statistic) calculated over the time period.

$$X_1 = Y\gamma_1 + X_3\gamma_3 + \delta \qquad (3)$$

where Y and X_1 are defined as above, while X_3 is a matrix containing information on variables supposed to explain the presence of a particular political institution. Equation 3 may be illustrated with reference to the example cited above, namely federalism. Federalism is more likely to exist in countries that have had some conflict (e.g., Switzerland) (Y) and a set of other variables (X_3). Most often scholars estimate some version of equation 2 without considering equation 3. This is perfectly legitimate and unproblematic as long as $\gamma_1 = 0$ and $\sigma_{\epsilon,\delta} = 0$.[16] The example of federalism as told by me would suggest that $\gamma_1 \neq 0$. Hence estimating equation 2 without considering equation 3 is likely to lead to biased inferences. For some institutions, however, we might legitimately presume that $\gamma_1 = 0$. The question then becomes whether $\sigma_{\epsilon,\delta} = 0$ or not.[17]

The remainder of this section is devoted to assess both at the substantive and empirical level whether the two assumptions necessary to estimate equation 2 without considering equation 3 are likely to be met in practice. To avoid any unnecessary suspense it suffices to say that this is almost never the case (at least according to my reading of the evidence).

3.1 Endogenous institutions: Substance

Insights stemming mostly from comparative politics would suggest that we know quite a bit about what explains the presence of particular institutions. Starting with democracy, a considerable effort has been put into explaining the presence and emergence of democracies in particular countries.[18] While Przeworski, Alvarez, Cheibub and Limongi's (2000) claim that we know more about what makes democracy endure than what makes it emerge (though see Boix and Stokes, 2003) might be true, we still see a strong correlation between the level of democracy and economic development. Similarly, often societal conflict linked to economic crises lead to democracies to fail (e.g., Przeworski, Alvarez, Cheibub and

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[16]Actually $\gamma_1 \neq 0$ only creates problems since almost by definition it induces $\sigma_{\epsilon,\delta} = 0$.

[17]While Alvarez (1997) argues that with $\gamma_1 = 0$ $\sigma_{\epsilon,\delta}$ is most likely 0, Alvarez and Glasgow (2000) correctly point out that an overlap in explanatory variables in equations 2 and 3 will lead to $\sigma_{\epsilon,\delta} \neq 0$ if some of the variables are measured with error.

[18]Przeworski (2005) proposes a model of democracy and Acemoglu and Robinson (2001) and (f Boix and Stokes, 2003)or transitions (see also Acemoglu and Robinson, 2005 forthcoming).

Limongi, 2000). Without going into too much detail, already these two elements suggest potential problems when estimating the effect of democracy in models as reflected in equation 2. Clearly, if Y in equation 3 stands for democracy, γ_1 is very unlikely to be equal to 0. Similarly in many models using democracy as explanatory variable economic variables are used as controls. Given that many of these are measured with error, we can hardly assume that $\sigma_{\epsilon\theta}$ to be zero. Hence, it is a good bet that many models relying on estimating equation 2 with democracy as independent variable are producing biased estimates for purposes of inference.

Recent work on federalism has suggested that there are very specific conditions that lead to its presence. While Riker (1964) focused on outside military threats Filippov (2004) demonstrates the more subtle arguments implied in this seminal work. More recent theoretical work suggests that size of the country and the heterogeneity of preferences in the population are linked to the presence of federal arrangements (Alesina and Spolaore, 2003). Panizza (1999) provides a theoretical model suggesting that democracy, size, economic development and ethnic fractionalization is related to decentralization. The results from empirical tests suggest that "size, income, and ethnic fractionalization are negatively correlated with the degree of fiscal centralization" (Panizza, 1999, 113).

Given these results one might suggest that no theoretical or systematic empirical study suggests that conflict "causes" federalism[19] and thus γ_1 could be equal to zero. As Panizza's (1999) empirical results show, however, many explanatory variables of federalism also appear as independent variables in models of conflict. Given that most of these most likely comprise measurement error, we cannot rule out a correlation of the error terms of equations 2 and 3. Thus, again, many empirical results suggesting strong effects of federalism on societal conflict and civil wars may reflect biased inferences.

Studies on electoral systems reveal several interesting patterns. Blais and Massicotte (1997) suggest that the colonial heritage has a strong influence on what electoral system is used in a particular country. Similarly, one finds considerable differences across continents, but also links to the level of democracy, with proportional representation appearing more frequently in highly democratic societies. Similarly Cox (1997) discusses the important link between the con-

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[19]One might take, however, Walter's (2006 forthcoming) results that governemt reactions to challenges are related to the number of ethnic groups, as evidence for such a relationship.

flict structure present in society and the presence of particular electoral systems. Probably no author claims that societal conflicts or civil wars affect the choice of a particular electoral system,[20] which would suggest that γ_1 in equation 3 is probably zero. But as the explanatory factors of electoral systems suggest, these are also frequent independent variables in models explaining conflict.[21] Again, this suggests that the errors in equations 2 and 3 are correlated, thus we need to consider both of these equations simultaneously

The type of electoral system is largely part of consensus democracies and implicit in consociational and power sharing arrangements. Thus, much of what I discussed above on electoral systems also applies for these latter institutions. In addition, power sharing arrangements mostly appear in societies with several deep societal cleavages (Lijphart, 1999). Again, one might debate whether conflict directly affects the adoption of power sharing arrangements, though South Africa and Switzerland would certainly offer illustrative examples. But clearly, the set of explanatory factors in most models using power sharing as explanatory political institutions overlaps, suggesting that the correlation between the errors in our two equations are not independent. Again, for purely substantive reasons we are led to believe that the effect power sharing arrangements has to be studied in a more complex empirical setting than done so far.

3.2   Endogenous institutions: Empirics

As noted above, few empirical studies focusing on the effect of political institutions on conflicts and civil wars assess the very likely problem of endogeneity. In part this may be explained by the fact that the classic test for endogeneity proposed by Hausman (1978) relies on a classical linear regression for the empirical model of interest. Most of the work on societal conflicts and civil wars relies, however, on non-linear models like limited-dependent variable or event history models. In the context of limited-dependent variable models Rivers and Vuong

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[20]Boix (1999) offers a theoretical model of choices of electoral sytems in advanced democracies.

[21]Persson and Tabellini (2003) in their work on the effect of political institutions also address the endogenous nature of electoral institutions. They find that majoritarian rule is less likely if the electoral system was adopted between 1921 and 1950, if the country is part of Latin America, and more likely if the proportion of english speakers increases (Persson and Tabellini, 2003, 103). In a more parsimonious model they find, like Blais and Massicotte (1997), a strong effect for having been an English colony.

(1988) as well as Bollen, Guilkey and Mroz (1995) provided empirical models allowing to address endogeneity problems. Drawing on these models either explicitly or implicitly, Sambanis (2000), Elbadawi and Sambanis (2002), Brancati (2005), Reynal-Querol (2005), and Schneider and Wiesehomeier (2005) deal with the potential problem of endogenous institutions.

If both the dependent variable and the possibly endogenous independent variable are continous, Hausman (1978) suggests instrumenting for the possibly endogenous independent variable. This implies finding variables related to this variable, which do not influence the dependent variable. Using the residuals of this first stage regression as additional regressor in the second stage regression allows for an exogeneity test. If the estimated coefficient for the residuals fail to reach statistical significance we cannot reject the hypothesis of exogeneity.

Brancati (2005), given that her dependent variable is a continuous measure of inter-communal conflict based on the MAR dataset, uses this approach. She instruments for the level of decentralization, the strength of regional parties and the level of ethnic conflict. In all cases Hausman's (1978) specification test suggests that her results do not suffer from any possible biases due to endogenity.

If the dependent variable of interest is dichotmous, however, Hausman's (1978) exogeneity test is no longer applicable. Rivers and Vuong (1988) and Bollen, Guilkey and Mroz (1995) provide, however, estimators testing for and dealing with endogeneity problems even in this case. Following Alvarez and Glasgow (2000) three different approaches may be distinguished:[22]

- Probit regression: This approach ignores the endogenity problem and is very likely to yield biased estimates.

- Two-stage probit least squares estimation: In this approach the possibly endogenous variable is regressed on exogenous variables unrelated to the dependent variable. The predicted values are used as regressor in the second stage probit estimation.

- Two-stage conditional maximum-likelihood estimation: In this approach

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[22]Bollen, Guilkey and Mroz (1995) add to these three estimators a full-information maximum-likelihood (FIML) and a generalized method of moments (GMM) estimators. They conclude their Monte-Carlo study, however, with the statement that "the much more complicated methods (FIML and GMM) often perform no better than the simple probit and two-step regression methods [discussed below]" (Bollen, Guilkey and Mroz, 1995, 128).

the possibly endogenous variable is regressed on exogenous variables unrelated to the dependent variable. The residuals of this regression are used as additional regressor in the second stage probit estimation.[23]

These latter two approaches have found applications in studies on the effect of political institutions on societal conflicts and civil wars. Sambanis (2000), studying the effect of partition, instruments this variable with several exogenous variables. Despite this correction, "which has good fit and is well specified" (Sambanis, 2000, 472), the effect of partition on civil wars remains non-existant.

Elbadawi and Sambanis (2002), given their time-series-cross-section dataset, use past values of exogenous variables to instrument for political institutions. Using Rivers and Vuong's (1988) proposed estimation technique they find that only a variable related to the Polity IV democracy score shows signs of endogeneity. The correction for this problem, however, hardly affects the results of the substantively interesting part of the model.

Reynal-Querol (2005), when assessing the effect of a political system's inclusiveness on the onset of civil war, attempts to address the problem of endogeneity. She uses as instruments a set of dichotomous variables measuring the origin of a country's legal system and the level of fractionalization. Using these variables as instruments, she fails to find any evidence for endogeneity.

Schneider and Wiesehomeier (2005) in their study of how polarization and political institutuons affect the onset of civil wars proceed like Reynal-Querol (2005). Instrumenting for the degree of democratization and various political institutions they also fail to find evidence for endogeneity.

4 Dealing with Endogeneity

Both tests of and corrections for endogeneity rely in essence on a two-stage instrumental variable approach. Such instrumental variable approaches are, however, not without pirfalls as both Bartels (1991) and Bound, Jaeger and Baker

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[23]This corresponds visibly to Rivers and Vuong's (1988) estimator, though it surprises that the correction for the variance-covariance matrix of the estimated coefficients is nowhere referred to by Alvarez and Glasgow (2000), nor in the applications by Alvarez (1997) and Alvarez and Butterfield (2000). The Monte-Carlo results reported by Bollen, Guilkey and Mroz (1995) suggest, however, that these corrections hardly affect inferences. Alvarez and Glasgow (2000) find that boot-strapping the standard erros of the estimated coefficients is hardly useful. This approach was chosen by Elbadawi and Sambanis (2002) and Christin and Hug (2004).

(1995) discuss and illustrate.[24] Bartels (1991) cautions researchers to be very explicit about the quality of the instruments used to replace potentially problematic variables. Bound, Jaeger and Baker (1995) report evidence from Monte-Carlo simulations suggesting that weak instruments, at least in the case of a classical linear regression, may make matters actually worse. Hence, reporting the results from two-stage instrumental variables estimations without reporting the fit of the first stage regression (e.g., Reynal-Querol, 2005),[25] makes these analyses rather difficult to assess.

In the context of the estimators of interest to us here, Bollen, Guilkey and Mroz (1995) clearly show that with a low fit in the first stage, both the endogeneity tests and the corrections for endogeneity perform less well.[26] But even if the fit in the first stage is rather good additional problems loom. Since the set of exogenous variables contained in X_2 and X_3 are very likely to overlap, identification might be a problem. Bollen, Guilkey and Mroz (1995) suggest two identification tests. The first one consists of deriving a reduced form equation from the two structural equations 2 and 3 of the following form:

$$Y \;\; = \;\; X_1\beta_1 + X_2\beta_2 + X_3\gamma_3 + \epsilon \tag{4}$$

The value of the likelihood function obtained from estimating equation 4 is compared to the one obtained from estimating equation 2 with X_1 replaced by its instrumented values obtained from estimating equation 3. If the restrictions imposed by the two-stage estimation approach are valid, the values of two likelihoods should be very close to each other. The negative of twice the difference in the likelihoods follows asymptotically a χ^2-distribution "with degrees of freedom equal to the number of overidentifying restrictions (e.g., the number of excluded

[24]While these authors address the case of instrumental variables in the classical linear regression, the same caution applies, probably even more forcefully, to the estimators discussed in this paper. Given the detailed treatement by Bartels (1991) and Bound, Jaeger and Baker (1995) of the issues in the case of a linear regression, I will refrain from extending my discussion to these problems. Instead I will focus on the case where the dependent variable of interest is dichotomous, but highlight many of the issues raised by Bartels (1991) and Bound, Jaeger and Baker (1995).

[25]This paper suffers from other methodological problems, like using row instead of column percentages in an analysis of a crosstab, while interpreting them as column percentages.

[26]In the case of Reynal-Querol's (2005) study, we may suspect a rater low fit in the first stage, since Schneider and Wiesehomeier (2005), using almost identical instruments and similar variables, find r^2s barely exceeding 0.1.

exogenous variables minus 1)" (Bollen, Guilkey and Mroz, 1995, 117).

The second test involves using in the estimation of equation 3 all variables in matrix X_2 except 1. These additional instruments should, if the exclusion restrictions are valid, not have any significant effect on X_1.

In what follows I illustrate these measures in the face of endogeneity be replicating some of Cohen's (1997) analyses on the effect of political institutions on the rebellious behavior of "minorities at risk." Unfortunately, the complete dataset that Cohen (1997) used in his study is not available, which explains why I do not replicate his analyses here.[27] In its stead I estimate a simple model inspired by Cohen's (1997) analysis assessing the effect of various political factors to explain the rebellious behavior of "minorities at risk."[28] The dependent variable is aggregated over five year periods for each of the "minorities at risk." In the dataset with 634 observations, however, only the 'minorities at risk"-period pairs from countries with free and fair elections appear. The simple model I estimated uses as independent variables federalism,[29] the tye of electoral system, the party system and the persistence of the polity. Column 1 in table 1 reports the results, and they largely reflect Cohen's (1997) findings. Federalism reduces the likelihood of rebellious behavior, and the same holds for proportional representation as electoral system. As the format of the party system increases and a polity can look back on a longer history, the likelihood of rebellious behavior increases.

If we suspect that the results reported in column 1 of table 1 are afflicted by the endogenous nature of federalism, we would need to find exogoneous variables related to the emergence of federalism. I use as exogenous variables those used in the model estimated above, but add two additional variables appearing in Cohen's (1997) partial dataset, namely economic and political discrimination.[30]

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[27]A partial dataset is available, which covers, however, only a subset of the variables used in his study. Christin and Hug (2003), following the descriptions in the article, reconstruct a dataset based on the same sources and find largely similar results. When addressing the issue of endogeneity they find, however, that the positive results found by Cohen (1997) fail to survive.

[28]The original variable used in Cohen's (1997) study is ordinal and ranges from 0 to 7 (see table 3 in the appendix for descriptive statistics of all variables employed in this paper), while for the illustrative purpose here I recode it into binary variable with 0 indicating no rebellious behavior and 1 reflecting some rebellious behavior. In earlier analyses not reported here I estimated a similiar model as here, while correcting for possible problems of endogeneity according to Hausman's (1978) exogeneity test. The results, despite a little glitch, also suggested that federalism is largely endogenous in this empirical model.

[29]Also here I gloss over a problem, since federalism is measured as an ordinal variable with three possible values ranging from unitary to federal.

[30]Two problems are immediately visible. First, a large overlap in the exogenous variables

Table 1: Endogenous institutions in Cohen (1997): federalism

Variables	(1) b (s.e.)	(2) b (s.e.)	(3) b (s.e.)	(4) b (s.e.)
federalism	-0.124 (0.069)	0.929 (0.470)		-0.155 (0.071)
federalism residual		-1.080 (0.478)		
federalism prediction			0.892 (0.465)	
electoral system	-0.249 (0.075)	0.142 (0.188)	0.132 (0.186)	-0.278 (0.077)
party system	0.421 (0.084)	0.163 (0.140)	0.154 (0.140)	0.436 (0.086)
polity persistence	0.002 (0.001)	-0.003 (0.002)	-0.003 (0.002)	0.002 (0.001)
economic discrimination				-0.153 (0.058)
political discrimination				0.059 (0.052)
constant	-1.102 (0.231)	-2.802 (0.791)	-2.700 (0.777)	-0.880 (0.250)
Log likelihood	-343.961	-341.393	-343.748	-340.188
LR χ^2	30.560	35.700	30.990	38.110
Prob $> \chi^2$	0.000	0.000	0.000	0.000
N	634	634	634	634

Table 2 reports the results of this auxiliary linear regression serving as first stage for the analyses that follow. The results suggests that all included exogenous variables affect considerably federalism. Proportional representation and economic discrimination affects it negatively, while the format of the party system, the persistence of the polity and political descrimination affects it positively. The fit of this first stage regression is reasonably good considering the insights provided by Bollen, Guilkey and Mroz's (1995) Monte Carlo study.[31] Thus, fol-

appearing in equations 2 and 3 reduces the effectiveness of two-stage estimations as Bollen, Guilkey and Mroz (1995) illustrate. Second, the theoretical justification for using these particular additional exogenous variables is largely absent. What follows illustrates, however, nicely these problems.

[31]Given the importance of the fit of the first stage regression, it surprises that with the exception of Schneider and Wiesehomeier (2005), none of the cited studies above report any

lowing the recommendations proposed by Rivers and Vuong (1988) and Bollen, Guilkey and Mroz (1995) I include in the emirical model estimated before as additional regressor the residuals from the model whose estimates appear in table 2. The results of this estimation appear in column 2 of table 1. Given that the coefficient estimated for this new regressor is relatively large and statistically significant, I can reject the null hypothesis of exogenous federal arrangements. Consequently, the results reported in column 1 of table 1 are likely to be biased because of the endogenous nature of federalism.

Table 2: Endogenous institutions in Cohen (1997): auxiliary regresssion

Variables	b (s.e.)
electoral system	-0.392
	(0.041)
party system	0.254
	(0.043)
polity persistence	0.005
	(0.001)
economic discrimination	-0.114
	(0.032)
political discrimination	0.094
	(0.029)
constant	1.643
	(0.125)
r^2	0.223
adjusted r^2	0.217
rmse	0.799
F	36.090
Prob > F	0.000
N	634

Following Bollen, Guilkey and Mroz (1995) I reestimate the original model while replacing the values for the federalism variable by the predicted values from the model reported in table 2. The results of this estimation appears in column

goodness of fit measures. It is likely that in the case of Elbadawi and Sambanis (2002) the use of lagged exogenous variables leads to rather unproblematically high r^2, while the omission of any such lagged variables by Schneider and Wiesehomeier (2005) results in a rather poor fit of the first stage. Given that Schneider and Wiesehomeier (2005) use similar instruments as Reynal-Querol (2005), one may presume that the fit of her first stage regressions is equally poor.

3 of table 1.[32] The findings stand in stark contrast to the ones reported in Cohen (1997) and those appearing for the first model shown in column 1 of table 1. First of all and substantively most interesting, the effect of federalism has become positive but has almost lost statistical significance. Second, all other variables in this model fail to reach statistical significance. These rather dramatic changes might be due, however, to the rather heroic assumptions made when specifying the first stage regression (and implicitly the second stage model, too).

Bollen, Guilkey and Mroz (1995) suggest in that case, as discussed above, estimating the reduced form equation 4. A possible test of the identification restrictions imposed here consists of comparing the values of the likelihood functions for the models appearing in columns 3 and 4 of table 2. A Hausman (1978) specification test based on a likelihood ratio test (χ^2= 5.13, df=3) suggests that the differences just slightly miss statistical significance (p=0.163). While the failure to reach statistical significance strictly speaking supports our identification restrictions, the closeness of the test and the rather haphazard way in which the two stages of the empirical model have been specified suggests however a more cautious approach. Quite clearly these specifications have to be improved upon. But the results also nicely illustrate how these identification tests proposed by Bollen, Guilkey and Mroz (1995) are useful in signaling potential problems in estimating such two-stage probit models.

5   Conclusion

Political institutions are part of those factors influencing societal conflicts and civil wars on which policy-makers may have some influence even in the short term (Belmont, Mainwaring and Reynolds, 2002, 2). Thus, it can hardly surprise that with increasing frequency scholars interested in explaining societal conflicts and civil wars study the effect of political institutions, like democracy, federalism, power sharing or particular electoral systems.

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[32]The standard errors are not corrected as suggested by Rivers and Vuong (1988), since Bollen, Guilkey and Mroz's (1995) Monte Carlo studies suggest that such corrections are largely unnecessary. Similarly, following Alvarez and Glasgow's (2000) finding that boot-strapped errors are hardly preferable, I also refrain from calculating those. This decision is also motivated by the fact that in estimations carried out for the paper by Christin and Hug (2004) we failed to find any significant differences between boot-strapped standard errors and the standard errors from the second stage probit estimation.

Such studies are, however, fraught with some difficulties, since institutions hardly fall from the sky. This makes assessing the effect of political institutions a hard nut to crack, as Przeworski (2004) convincingly, and almost depressingly, argues. In this paper I sought to illustrate this problem by offering some formalized structure in which the problem of endogenous political institutions can be assessed. I think I have convincingly argued, that both from a substantive and an empirical point of view it is very unlikely that in studies of societal conflict and civil wars political institutions can be considered as exogenous.

Starting from this premise I discussed several studies having addressed with various success the potential endogeneity of political institutions. Interestingly, most of these studies are unable to reject the null hypothesis of the exogenous nature of institutions. As Bollen, Guilkey and Mroz (1995) suggest, however, such results may be in part due to the specification of the first stage and issues of identification.

I illustrated these measures by replicating in part an analysis by Cohen (1997) on the effect of federalism on rebellious behavior of "minorities at risk." A test of endogeneity allowed the rejection of the null hypothesis of exogeneity.[33] Thus, instrumenting for the problematic variable with a set of endogenous variables, I found that contrary to Cohen's (1997) findings, federalism fails to reduce rebellious behavior.[34] The additional tests proposed by Bollen, Guilkey and Mroz (1995) suggest that first stage regression has a sufficient fit, but the identification of the overall model is only marginally given. Hence, more attention should be devoted to specifying the empirical model, which, with the restrictions from the data at hand, is not an easy task. Nevertheless, future research should assess the problem of the endogeneity of federal arrangements with the help of a more comprehensive dataset. Even in the absence of this, the paper has achieved its goal if more attention is being devoted to the problems of endogenous institutions, and the various tests and corrections are carried out with sufficient care.

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[33]Similarly, in replications of Reynal-Querol's (2002a) and Fearon and Laitin's (2003) work (Christin and Hug, 2003) find evidence for endgenous institutions.

[34]The negative effect of federalism also fails to materialize in a more complete reconstructed dataset, if issues of missing data and selection bias in the MAR dataset are addressed (Christin and Hug, 2003).

Appendix

Table 3 reports the descriptive statistics for the variables used in this paper.

Table 3: Descriptive statistics of variables from Cohen's (1997) partial dataset

Variable	Minimum	Mean	Maximum	Std. Dev.	N
rebellion	0	0.7634	7	1.6544	634
rebellion (dichotomous)	0	0.2539	1	0.4356	634
federalism	1	1.6861	3	0.9033	634
electoral system	1	1.7145	3	0.8331	634
party system	1	2.3612	3	0.7690	634
polity persistence	-4	31.6562	297	53.1357	634
transition	0	0.2224	1	0.4162	634
economic discrimination	0	1.9211	4	1.2418	634
political discrimination	0	1.9511	4	1.3616	634

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