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Contingent Technocracy:

Bureaucratic Independence in Developing Countries

Supplemental Appendices

(Not for publication)

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**Appendix A: Sources for initial counts of state-owned enterprises**

The sources listed below were relied on to calculate the initial size of the state-owned sector in 1990 so that year on year sales could be measured as a percentage of the overall size of the state sector. This approach facilitated comparison across cases where the number of state-owned enterprises (SOEs) in each country varied considerably. To determine the size of the state owned sector, we initially consulted primary government sources, often the legislation that enacted the government’s privatization policy. Where the legislation only listed the SOEs to be privatized rather than the size of the whole sector, we consulted other official government documents, data furnished by the World Bank or its representatives, data gathered by donors such as the US Agency for International Development. Where this material was lacking, we consulted secondary sources, usually country case studies, to determine the size. A study by John Nellis (1986) provided the number of SOEs for most African countries in the 1970s and 1980s, was out of date for many cases. We relied on Nellis when other sources could not be found.

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**Appendix B: Sources and methods for legislative coding of agency independence**

For each of the countries in our sample, we determined whether there was a government agency with a legislative mandate to manage the privatization of SOEs. We recorded the year in which each country created its privatization agency (if any). After reviewing the legislation that created the privatization agency, we coded the agency for each country with respect to four dimensions of formal agency independence:

1. Legal Status
2. Oversight
3. Personnel
4. Operations

Each of these dimensions were captured with the legislative indicators listed in Table 2, following the procedure described in the main text. The legislative sources that were consulted to code agency independence are listed below. Where official sources could not be found, we consulted secondary sources.

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**Appendix C: Descriptive statistics and propensity weight estimation**

*Descriptive statistics.*Table C1 offers a descriptive summary of the data used in the estimation models presented in this paper and appendices.

Table C1: Descriptive statistics

*29 African countries, 1990-2007 (1990 base year).*



*Propensity weight estimation.*The estimates presented in Table 3 and Figure 2 were generated using Hirano and Imbens’ (2004) generalized propensity score weighting method, a generalization of the more familiar binary treatment model. The method proceeds in two stages. The first stage estimates the likelihood of being assigned some level of treatment, including zero treatment, as a function of observable covariates. The result is a propensity score for each country-year. In the present analysis, the “treatments” are varying degrees of formal agency independence. We estimate propensity scores based on several economic, demographic, and political variables. We also include a dummy for each country-year’s participation in an IMF standby agreement as a means of measuring the influence of international development institutions’ on the creation of privatization agencies. Propensity scores were calculated using STATA’s ‘gpscore2’ procedure by Guardabascio and Ventura (2014).

We tested several levels and intervals of “treatment” (degrees of formal agency independence) to define cutpoints for the Hirano and Imbens (2004) procedure based on the distribution of the agency independence scores. We settled on three treatment levels (0.00-0.14, 0.14-0.43, and >0.43), with ten intervals of treatment within each level. This combination generated the most favorable balancing property according to the Bayes factor test.

Table C2 reports the results of the propensity score estimation; Figure C1 depicts the distribution of the resulting propensity scores. Generalized propensity weights were then calculated as the inverse of these propensity scores; that is, one divided by the propensity score. These propensity weights were used to weight cases in the estimation models reported in Table 3, as well as in the robustness checks reported in Appendix D as noted.

Table C2: Generalized propensity score estimation



Figure C1: Distribution of generalized propensity scores



**Appendix D: Robustness considerations**

We fitted the models reported in Table 2 using several alternative estimation procedures in order to test the stability and robustness of the findings. Here we report the results of ten alternative models that include the direct effects of *democracy* and *agency independence,* as well as their interaction. Here we briefly describe each alternative estimate, and then present the results in Tables D1-D3 and Figures D1-D2. As these results show, the contingent relationships between democracy, formal agency independence, and privatization of state-owned enterprises (SOEs) were remarkably consistent across analyses.

*Model D1.* Two-stage linear regression with endogenous binary treatment using Maddala’s (1983) estimation procedure instead of propensity score weighting. In this case, the binary treatment is the presence (1) or absence (0) of a privatization agency in each country-year.

*Model D2.*Conventional linear panel regression with country and year fixed effects, fitted without generalized propensity score weights.

*Model D3.*Linear panel regression with Driscoll-Kraay standard errors. Our cases share a common timeframe and geographic region, and so unobserved events in some times or sub-regions might affect panels in ways that are not captured by the fixed effects. If so, the unobserved effects are expressed in the disturbance term, resulting in consistent and unbiased, but inefficient estimators and biased standard errors (DeHoyos and Sarafidis 2006). Frees and Freidman tests of cross-sectional dependence confirmed non-trivial cross-sectional heteroskedasticity, and so in this model we employ the covariance matrix estimation procedure proposed by Driscoll and Kraay (1998) to generate efficient estimators with cross-sectional heteroskedasticity. See Hoechle (2007) for a discussion of the advantages of Driscoll-Kraay estimation vs. Beck and Katz’s (1995) panel-corrected standard errors in analysis of medium-sized panels where the ratio of periods to units is small, as in the present study.

*Model D4.*Linear panel regression with country and year fixed effects, with standard errors jackknifed by country to guard against bias due to outliers (see also Model D7).

*Model D5.*Linear panel regression with random effects.

*Model D6.*Linear panel regression with fixed effects with panel-corrected standard errors following the procedure suggested by Beck and Katz (1995).

*Model D7***.** Conventional linear panel regression with country and year fixed effects with generalized propensity score weights, but without lagged dependent variable. In this model the dependent variable is the number of SOEs privatized, rather than a cumulative percentage.

*Model D8.*Propensity weighted linear regression with fixed effects as in Model Two (Table 3), excluding Mauritius. Mauritius is an unusual case in some potentially important ways: it is a small, island country (1.2 million population 2007) and a stable democracy (Polity IV=10) from 1990-2007. Mauritius also did not establish a privatization agency during the period of analysis, although it did privatize one SOE. In order to ensure that this unusual case was not driving the conditional effect observed in Model Two, we estimated the same model excluding Mauritius (N=476).

*Model D9.*Conventional linear panel regression with country and year fixed effects, including only the country-years with a privatization agency in place and fitted without generalized propensity score weights. This model effectively drops “zero cases.”

*Model D10.*Propensity weighted linear regression with fixed effects as in Model Two (Table 3), including only data from 1990-1999. From 1990-1999 the World Bank recorded privatizations of all SOEs. Beginning in 2000, the World Bank began recording only privatizations valued at over one million U.S. dollars. As an additional robustness check, here we estimate the model using only the data from 1990-1999. The resulting marginal effects plot is shown in Figure D2.

Table D1: Endogenous treatment effects regression



Table D2: Regression with alternative estimators



Table D3: Regression with alternative samples



Figure D1: Marginal effect of agency independence on cumulative privatization with alternative estimation procedures







Figure D2: Marginal effect of agency independence on cumulative privatization,  
1990-1999 data only



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