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The impact of income on democracy revisited

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ABSTRACT

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This paper revisits the important issue of whether economic development promotes democracy by using the system-GMM method, which is superior to the difference-GMM method when dependent variables (democracy in this paper) are highly persistent over time. With the same data set as that of Acemoglu et al. (2008), we find that the system-GMM estimated coefficient of income per capita is positive and highly statistically significant, in sharp contrast to the difference-GMM results reported by Acemoglu et al. (2008). Furthermore, employing the US and Colombia as an example, we find that much of the difference in democracy across countries can be explained by the corresponding difference in income per capita. *Journal of Comparative Economics* **41** (1) (2013) 159–169. Faculty of Business and Economics, University of Hong Kong, Hong Kong; Department of Economics, National University of Singapore, Singapore; Department of Economics, Hong Kong University of Science and Technology, Hong Kong.

1. Introduction

A proposition of major and perennial interest to both economists and political scientists is whether economic development promotes democracy. Many studies have reported a positive association between income per capita and the degree of democracy (see, for example, Lipset, 1959; Barro, 1997, 1999; Papaioannou and Siourounis, 2008). However, establishing the causal impact of economic development on democracy is challenging, because there could be unobserved factors influencing both economic development and democracy (i.e., the omitted variables issue), and there may also be reverse causality running from democracy to economic development. In a seminal paper, Acemoglu et al. (2008) (AJRY) use the fixed effects specification to account for time-invariant unobserved factors, and surprisingly find no positive and statistically significant relationship between income per capita and democracy.

As the degree of democracy in an economy is highly persistent over time, AJRY (2008) include the lagged value of democracy in their regression analysis. However, in their fixed effects specification, the difference of the lagged democracy is correlated with the difference of the error term, causing biased estimations of the impact of income per capita. To address this problem, AJRY (2008) use the difference-GMM estimation method developed by Arellano and Bond (1991), in which the difference of lagged democracy is instrumented by all the further available lags of democracy. Recent advances in econometrics, however, show that these available lags of democracy only explain a very small portion of the difference of the lagged democracy (i.e., the weak instrument problem; see Staiger and Stock, 1997; Stock and Wright, 2000; Stock et al., 2002) when

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Table 1
Simulation results.

N	α	Fixed effects (1)	Difference-GMM (2)	System-GMM (3)
100	0.5	−0.0037	0.464	0.510
		(0.070)	(0.267)	(0.133)
	0.8	0.134	0.484	0.810
		(0.072)	(0.822)	(0.162)
	0.9	0.191	0.226	0.941
		(0.073)	(0.826)	(0.156)

Note: This table is copied from Table 2 of Bond (2002). There are four periods and 1000 replications in the simulation. N is the number of panel units in the panel data. α is the true persistent rate. Columns 1–3 report the mean of the 1000 replications for fixed effect, difference-GMM and system-GMM results, respectively. The standard errors are reported in the parentheses. For more information, please refer to the original paper (Bond, 2002).

the dependent variable is highly persistent over time. To resolve this weak instrument problem, Arellano and Bover (1995) and Blundell and Bond (1998) develop a new method called the system-GMM in which the difference-GMM equations are stacked by the level equations where the lagged dependent variable is instrumented by the difference of the lagged dependent variable. In a simulation study of the AR(1) model,[1] Bond (2002) shows that the system-GMM estimation always outperforms the difference-GMM estimation, especially when the dependent variable is highly persistent over time.[2] Specifically, as shown in Table 1 (copied from Table 2 of Bond, 2002), the difference-GMM estimate of α is 0.484 (or 0.226) when the true value is 0.8 (or 0.9), whereas the corresponding system-GMM estimate is 0.810 (or 0.941).

Democracy is indeed highly persistent over time. In Table 2, we present various estimation results of the first-order autoregression of democracy. The OLS estimated coefficient is 0.866, which is usually considered the upper bound, whereas the panel fixed effect estimated coefficient is 0.419, which is often considered the lower bound. The most valid estimate is 0.817 obtained from the $t-3$ system-GMM estimation, as it satisfies the identification assumptions implied by the insignificant Hansen J test and the insignificant difference Hansen J test. Because of the highly persistent nature of democracy (i.e., with the AR(1) coefficient being 0.817), the coefficient of the lagged democracy in the AJRY (2008) difference-GMM estimation is only weakly identified and biased, causing the estimated coefficient of income per capita to be biased or even misleading. In this paper, we use the system GMM estimation method to revisit the impact of income per capita on democracy with the same data set as that employed by AJRY (2008) (downloaded from the AER web site).

We find that under the system-GMM estimation, the estimated coefficient of income per capita becomes positive and highly statistically significant, in sharp contrast to the results AJRY (2008) obtain from the difference-GMM method. We then conduct a series of robustness checks: five exercises mirroring those of AJRY (2008) (an alternative measure of democracy, different sub-samples, additional controls, external instrumental variables for income per capita, longer sample periods, and longer time intervals for variable measurement), one exercise the same as that conducted by AJRY (2009) (differential impacts across countries with different initial degrees of democracy), one exercise similar to that of Boix (2011) (different sample periods), one exercise including the additional controls used by Boix and Stokes (2003), Boix (2011), and Miller (forthcoming), and a new exercise (extending the analysis to more recent years). In all these exercises, we find that the coefficient of income per capita is always positive and statistically significant. As a further robustness check, we follow AJRY (2008) in calculating the extent to which our estimation results explain variations in the degree of democracy across countries. Using Colombia as an example, we find that if we elevate income per capita in Colombia to the level of the United States in 2000, our estimation results explain almost all the difference in democracy between these two countries. Overall, this study lends strong support to the modernization hypothesis that economic development promotes democracy (Lipset, 1959).

Several other recent studies have challenged the robustness of the results of AJRY (2008). Boix (2011) overturns the main results of AJRY (2008) by extending the data to the early nineteenth century, when hardly any countries were democratic, and by adopting a broader theory of development and international relations. Benhabib et al. (2011) also re-establish the positive impact of development on democracy by utilizing newer income data and using estimation methods to deal with the problem of measures of democracy being censored. Our paper differs from these two studies by using the same data sets as those employed by AJRY (2008), but we reverse the results of AJRY (2008) by adopting the system GMM estimation method, which is considered more suitable than the panel fixed effects estimation or difference-GMM estimation method when the dependent variable (i.e., democracy in this paper) is highly persistent over time.

Our paper is also related to the literature regarding the exogenous theory of democracy (i.e., that development has a positive impact on the stability of a democratic country) versus the endogenous theory of democracy (i.e., that development has a positive impact on the transition of an autocratic country to a democratic one). Przeworski and Limongi (1997) and Przeworski et al. (2000) find that development helps democratic countries become less likely to revert to autocracy (i.e., providing support for the exogenous theory of democracy), but it has a limited effect on the democratization of autocratic

[1] The model specification is $y_{it} = \alpha y_{i,t-1} + (\eta_i + \upsilon_{it})$, where i represents the panel unit; t represents time; η_i is the panel fixed effect; and υ_{it} is the error term.
[2] Many recent empirical studies have shown that the system-GMM estimator performs better than the difference-GMM estimator; see, for example, Blundell and Bond (2000), Bobba and Coviello (2007), Castello-Climent (2008), Roodman (2009a), and Aslaksen (2010).