4

Electoral Systems and Real Prices around the World

We have proposed that a democracy's electoral rules are linked to the regulatory output of that country's elected legislators, and that this effect manifests itself in a country's real-price levels. In particular, we contend that the greater seat-vote elasticities of majoritarian electoral systems will tilt policy in favor of consumers, while proportional systems should strengthen producers; and that the pro-consumer bias of majoritarian systems should lead to systematically lower prices.

Empirical testing of our hypothesis in Chapter 3 supported the expected relationship between majoritarian electoral institutions and lower real prices among the wealthy, developed democracies of the Organization for Economic Cooperation and Development (OECD). Among the twenty-three OECD democracies, a country that shifted from a proportional to a majoritarian electoral system was estimated typically to enjoy a short-run yearly reduction in real prices of about 1.2 index points (where U.S. prices = 100),

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corresponding to a long-run reduction in real prices of at least 10 percent. This is about half of a standard deviation of average prices across OECD countries – over time, a significant effect.

However, OECD democracies represent only approximately one quarter of all democracies worldwide, and they differ in significant ways from democracies outside the OECD – above all, in levels of wealth. In the year 2000, the average per capita GDP of an OECD member country was six times greater than that of an average non-OECD democracy. Even though wealth is the leading predictor of real-price levels cross-nationally (Rogoff 1996), our model makes no distinction between rich and poor democracies. Therefore, the empirical question remains: will electoral systems have the same price effects in economically less developed democracies? Not necessarily, and indeed there are good reasons *ex ante* to conjecture that the effects might even be reversed.

For a variety of reasons, political institutions tend to be weaker in poorer societies, and perhaps weakest of all in poor democracies. The very regulatory mechanisms that affect competition and prices in economically advanced democracies might have little effect in poorer ones, or at any rate the marginal effects of electoral systems might be overwhelmed by the usual plethora of poorer-county problems: corruption, instability, frequent reversions to authoritarian rule (Adserá, Boix, and Payne 2003; Przeworski et al. 2000; Treisman 2000;

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Mauro 1995). Even more problematic, an extensive literature suggests why, in at least a considerable subset of poorer countries, consumers might actually prefer higher real prices in the form of an appreciated currency – and hence, in terms both of our theory and of the Stigler-Peltzman framework on which it relies, why an electoral system that increased consumer power might actually raise prices rather than lowering them (Frieden and Stein 2001; Leblang 1999; Frieden 1991). Testing our theory only in the OECD, therefore, is not enough.

In this chapter, we broaden our analysis to span the complete population of all democracies worldwide, from 1972 to 2000. Very specifically, we ask: all else equal, are real-price levels actually lower, over time and cross-nationally, in democracies with majoritarian electoral institutions than in democracies that elect by proportionality? Were we to examine all democracies worldwide and find no electoral system effect on prices, our theory would at a minimum require qualification.

In fact, this is not what we find at all. This chapter provides the strongest evidence yet that, in addition to their political and macroeconomic effects, electoral systems also have policy effects, as legislators regulate to vie for the electoral support of producers versus consumers. To preview our results, we estimate the effect of electoral system on real prices worldwide to be worth between two and three index points yearly, corresponding to a long-run difference of more than 10 percent, in the expected direction.

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Why Might Our Theory Break Down Outside the OECD?

Variation in the seats-votes elasticity of a country's electoral system, as argued earlier, affects legislators' incentives to favor either the interests of consumers or those of producers when formulating economic regulation. As the share of legislative seats won by any particular political party becomes increasingly sensitive to small changes in the aggregate national vote, consumers (*qua* voters) are empowered over producers, and legislators are exposed to increased electoral pressure to implement regulatory policies that keep the prices of goods and services low. In contrast, lower seats-votes elasticities give parties greater flexibility to appeal to producers over consumers; thus predicting higher consumer prices – and, in the short term, greater producer profits.

A country's "real" price level is the U.S. dollar equivalent of a generic basket of goods in that country. It is calculated (as noted earlier) simply as the cost or "purchasing power parity" (PPP) of those goods in local currency, divided by that country's exchange rate (XR) with the United States. This ratio of a country's PPP to XR standardizes price measures for cross-national comparison.

In the OECD, policy debates over market regulation predominantly determine the value of PPP. Yet consider a typical poor-country scenario that involves production almost entirely for export, with virtually all consumer goods being

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imported. Examples include Brazil and Ghana in their heyday as the world's leading producers of coffee and cocoa, respectively; early twentieth-century Argentina (exporting chiefly meat and wheat, importing from Britain virtually everything else it consumed); Chile when exports of copper ore dominated its whole economic life; and almost every major petroleum-exporting country.

In such a situation, as Jeffry Frieden has emphasized in general and Robert Bates (1997; 14–15, 33–36) has illuminated in the particular case of Brazil, the country's exchange rate almost inevitably becomes a dominant political issue, producers favoring a depreciated currency and consumers an appreciated one. The logic is simple: when coffee beans sold for $1 a pound on world markets, Brazilian coffee producers wanted each of those dollars to translate into as many *réis* as possible; but Brazilian consumers wanted each *real* to trade for the greatest possible number of dollars, so as to buy imported goods most cheaply. In the usual economic terms, however, all else being equal a depreciated exchange rate (a large XR) denotes lower real prices, while an appreciated (or small) XR denotes higher real prices.

This perverse result, exactly the opposite of what would obtain in a more diversified economy, means that political institutions that augment consumer power very well might lead to an appreciated exchange rate (and raise real prices), while ones that increase producer power would depreciate

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the exchange rate (and lower real prices).[1] For these export-dependent economies, then, we would expect if anything that majoritarian electoral systems would entail higher real prices; and, admitting that such economies are a considerable fraction of the whole set of less developed countries, we might reasonably expect at a minimum some attenuation, at a maximum a reversal of the majoritarian-low prices link that we observed in the economically advanced democracies.

Democracies and Electoral Systems Worldwide

The number of countries under democratic rule worldwide has risen steadily over the past thirty years. To begin our analysis, we partition the world's countries into democracies and nondemocracies using two rigorous and widely accepted – but distinct – rating methodologies: the annual Freedom House measure of "political rights" (Freedom House 2004) and the annual Polity IV Project "combined polity score" (Marshall and Jaggers 2002). Both methods assign every country in the world a yearly, ordinal score measuring the presence or absence of various aspects of democratic governance: free, regular, and competitive elections, meaningful political

[1] This pattern extended, in the Latin American cases, to democracy itself. Typically the authoritarian regimes, which entrenched the power of economically concentrated producers (particularly landowners), kept the local currency depreciated, while under episodes of democracy the exchange rate was kept artificially high.

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opposition, universal suffrage, and so forth.[2] Countries rated 1 or 2 on the 7-point Freedom House scale, and 6 or greater on the Polity IV scale (which ranges from −10 to +10) are generally considered to be democratic.[3]

The Freedom House and Polity IV scores, while highly correlated, are not interchangeable. They employ different methodologies, and the use of either may produce substantively divergent results (see Casper and Tufis 2003; Munck and Verkuilen 2002). Most significantly, countries and years identified as democratic by Freedom House are not always identified as democratic by Polity IV, and vice versa.[4] We therefore err on the side of caution and perform separate analyses on

[2] While there exist multiple definitions of what exactly constitutes a democracy (see Przeworski et al. [2000], ch. 1 for a thorough review), these factors capture the most widely agreed-upon criteria. Note that some, particularly Elkins (2000) and Treier and Jackman (2003) have cautioned against the measurement of "democracy" as a dichotomy, preferring continuous or latent measures to capture gradations of democratic features of governance. As we are only interested in measuring democracy for the purpose of selecting a sample, however, a dichotomous measure is appropriate to our methodology.

[3] Examples of other studies in political science employing these rules include, for *Freedom House*, Tavits (2005), Barro (1999), Blais and Dobrzynska (1998), and Bollen (1993); and for *Polity IV*, Li (2006), Blais, Dobrzynska, and Indridason (2004), and Dixon (1994).

[4] One notable example is Poland in1990. Whereas *Freedom House* considers Poland to have been democratic in 1990, *Polity IV* codes Poland as not becoming democratic until 1991. Arguably, *Polity IV* provides the superior measure here. In Poland's 1989 parliamentary election, only 35 percent of the seats were competitive; the rest were reserved for the Communist Party. A fully competitive parliamentary election was not held until 1991.

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the two similar but not identical populations of democracies as identified by each coding system.

Our analysis spans the years from 1972 to 2000. Over this interval, a few countries were democracies for such a short period of time that we would not realistically expect any relationship between electoral system and real prices to obtain. We therefore filter from our data sets country-years with very brief (only one or two years at a time) spells of democracy. We also drop a small number of countries with five or fewer total years of democratic rule in this twenty-nine year span. Taken together, these restrictions turn out to be fairly noninvasive. The resultant Freedom House data set includes 1671 country-years of democracy, spanning 90 different countries, and the Polity IV data set includes 1,467 country-years of democracy, spanning 76 different countries.

For each of these democracies, we again measure electoral system elasticity, as before, as a dichotomous indicator of whether a country employs majoritarian or proportional electoral rules, reflecting the central divide between the world's electoral systems (Lijphart 1999; Powell 2000). Majoritarian electoral systems are distinguished by their use of winner-take-all, single- member legislative districts (SMD), typically decided by either majority or plurality vote. Proportional systems, on the other hand, employ multimember legislative districts in which two or more winners are selected in proportion to the vote outcome of each district. By design,

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proportional systems have extremely low seats-votes elasticities in the neighborhood of one. Majoritarian systems, in contrast, introduce much greater distortion into the seats-votes function at the district level, and thus have more potential for large changes in seat share given relatively smaller changes in vote share.[5]

To code the electoral system variable, we rely on Colomer's (2004) *Handbook of Electoral System Choice* and Golder's (2005) data set of world electoral systems.[6] Countries with only SMDs we code as majoritarian (1), and countries with only multimember legislative districts we code as proportional (0).[7] A handful of democracies employ mixed electoral systems that elect legislators using both single-and multimember districts. In these cases, if a country allocates more than half of its seats in SMD and the overall seat allocation rule is either parallel or two-tiered (with the single-member and multimember district seats allocated separately, and at

[5] Exceptions to the rule of high levels of majoritarian system elasticity may occur when the overall number of electoral districts is small, as elections become less competitive, or as partisan gerrymanders create many safe seats.

[6] These references were further cross-checked against the World Bank's *Database of Political Institutions* (Beck, Clarke, Groff, Keefer, and Walsh 2001).

[7] Following this rule, Japan's single nontransferable vote and Mongolia's block voting systems are coded as proportional; that is, as having a seats-votes elasticity more similar to proportional systems than to majoritarian systems. Recoding these two countries as majoritarian only strengthens the significance of our findings.

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least one of the tiers employing SMD), then we consider that country to be majoritarian. Otherwise, if half or more of the seats are allocated in multimember districts, or if more than half of the seats are elected in SMD but the overall seat allocation rule is proportional, then we consider that country to be proportional.[8]

In sum, our data sets contain a large amount of information about democracies outside the OECD, with non-OECD democracies representing approximately 60 percent of the cases. Even in the early years of the study, the population is never dominated by the OECD. By electoral system, approximately one-third of the observed country-years are majoritarian (Table 4.1).

Of the countries included in either the Freedom House or Polity IV data sets, only ten ever switched between majoritarian and proportional electoral systems during the time period under investigation: France, Italy, Japan, and New Zealand within the OECD, and Latvia, Mongolia, Poland (assuming it was democratic in 1990), Sri Lanka, Thailand, and Ukraine outside the OECD. In addition, there were five countries – Bolivia, Bulgaria, Lithuania, Madagascar, and

[8] For more on this distinction, see the useful glossary of Colomer (2004), particularly pp. 550–551. The system of mixed single- and multimember electoral districts with overall proportional allocation of seats is occasionally termed "personalized proportional representation," "compensatory allocation," or "mixed member proportional." Examples include Germany, Venezuela, and postelectoral reform New Zealand.

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Table 4.1. Distribution of cases among OECD and non-OECD democracies in the two data sets. Majoritarian systems are denoted SMD and proportional systems are denoted PR. Mixed systems are allocated as described in the text

	***Freedom House* data set**			
	PR	SMD	% SMD	Total
OECD	475	181	27.6	656
Non-OECD	557	458	45.1	1015
Total	1032	639	38.2	1671
	***Polity IV* data set**			
	PR	SMD	% SMD	Total
OECD	415	181	30.4	596
Non-OECD	573	298	34.2	871
Total	988	479	32.7	1467

Venezuela – that adopted mixed electoral rules without altering the basic majoritarian/proportional orientation of the preceding system.

Global Trends and Explaining Variation in Real Prices

The dependent variable in this study is the real price level of GDP, measured both cross-nationally and over time. Following the Penn World Tables (PWT) 6.1 (Heston, Summers, and Aten 2002), from which we draw price level data, the United States is selected as a baseline country with real price levels

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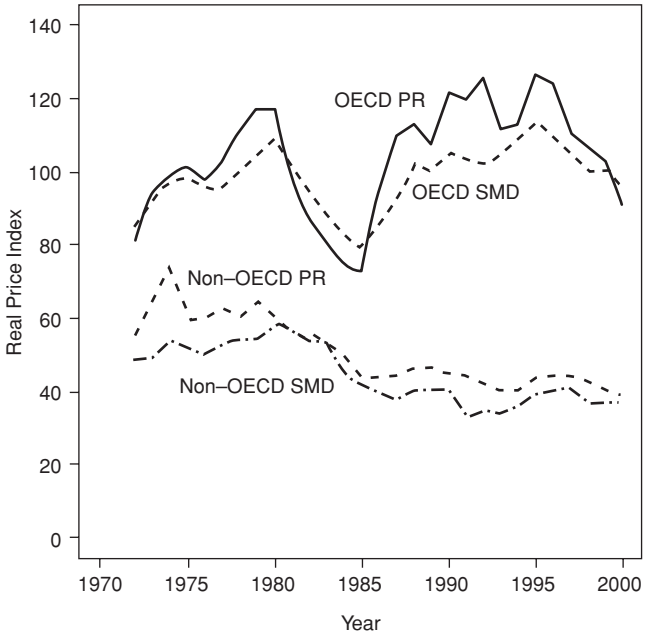

Figure 4.1. Average real prices by electoral system among OECD and non-OECD democracies in Polity IV data set, 1972–2000. Each trend line represents only the central tendency of prices; around each mean value, the standard deviation in each subgroup, each year, is approximately twenty index points.

fixed at 100 in all years. Other countries' price levels are then calculated as the domestic price level of GDP, divided by the U.S. exchange rate, times 100.

Real price levels exhibit a great deal of variation both across country and over time (Figure 4.1). In devising a series of models to explain this variation, we focus especially on the

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massive gap in real prices between rich and poor democracies, to test whether the effect of electoral systems on price levels is conditioned by variation in levels of wealth.

As in earlier chapters, we include statistical controls for one-year lagged real prices, per capita GDP, imports as a percent of GDP, population size, the change in yearly exchange rates with the U.S. dollar, and the U.S. inflation rate.[9] A country's real price level changes continually over time as a function of its two constituent measures: domestic price levels and exchange rates with the United States. Controlling for real price levels in the previous year captures the bulk of this dynamic, and ensures that the explanatory effect of the other independent variables on yearly real price levels is not overestimated in our regression models.

How a country's wealth drives up its real price levels was first explicated by Balassa (1964) and Samuelson (1964), and wealth has been extensively confirmed as the strongest predictor of price levels cross-nationally (see also Rogoff 1996; Bergstrand 1991; Bhagwati 1984; and Kravis and Lipsey 1983). Because the variance in per capita GDP over time is greater

[9] The literature on explaining cross-national variation in real price levels stems primarily from empirical testing of the theory of the "Law of One Price," which claims that cross-national differences in real price levels should be systematically eliminated over short periods of time through the process of arbitrage. In reality, this "law" only holds in highly attenuated form (see for example Rogoff 1996; Bergstrand 1991; Kravis and Lipsey 1988; and Clague 1986).

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in wealthier countries, per capita GDP describes a curvilinear relationship with real price levels.

Economic openness to trade, as measured by the value of a country's imports as a percent of GDP, is expected to correlate with lower real price levels, as it increases opportunities for arbitrage and reflects reduced state ability or will to maintain abnormally high price levels. Large population size is likewise expected to push down real price levels, by increasing opportunities for market specialization and by producing economies of scale.

Controlling for yearly changes in exchange rates accounts for an important time dynamic in the dependent variable. Because exchange rates fluctuate more rapidly than do domestic price levels, we expect recent currency depreciations to lead to short-term decreases in the real price level, and vice versa. The coefficient on the change in exchange rates should therefore be negative.[10]

Lastly, the fact that global real prices are indexed to the United States requires that some corrective be employed to control for the fact that increasing United States inflation

[10] Currency depreciation from one year to the next is revealed by an increase in the number of units of local currency required to "purchase" one U.S. dollar. Recall that, by construction, real price levels are calculated with exchange rates in the denominator, so that unless currency depreciations (i.e., increases in the denominator) are matched by identical and immediate price increases in the numerator – which they typically are not – then the effects will fail to offset, and real prices will drop. Obviously, the reverse is also the case.

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weakens the U.S. dollar against foreign currencies. Regardless of what is happening abroad, if the dollar weakens, real prices outside the United States will appear to decrease even if, for the domestic consumer, price levels remain constant. Therefore we expect the coefficient on this variable to be negative.[11]

In addition to the price level data that we obtain from the PWT 6.1, we obtain U.S. inflation rate and per capita GDP data from the International Monetary Fund World Economic Outlook database, and data on the remaining control variables from the World Bank World Development Indicators data set.

Testing the Electoral System Effect

With many more countries than years observed, our data sets are time-series cross-sections (TSCS). As Beck and Katz (2004, 27) note, "There is no mechanical solution ... for dealing with TSCS data; analysts must think about how to model their particular data." To test our theory in the OECD countries, we applied ordinary least squares with panel-corrected standard errors (OLS-PCSE; see Beck and Katz 1995). The coefficient on

[11] The U.S. inflation rate tracks closely with the U.S. current account balance as percent of GDP, for which there are also reasons to expect a price effect. Current-account deficits represent the willingness of foreign countries to subsidize consumption in the United States, which imply higher real prices in the United States with respect to the rest of the world. Using this variable instead of the inflation rate in the models produces nearly identical results.

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the electoral system variable was thus an estimate of how real price levels would change, *ceteris paribus*, if a country hypothetically switched between majoritarian and proportional electoral systems.

As the scope of our inquiry in this chapter is the entire population of democratic countries in the world, we are less interested in the conditional effect on real price levels of particular countries' switching between majoritarian and proportional electoral systems – a rare event, regardless – but rather in drawing inferences about marginal group differences between majoritarian and proportional democracies. Based upon this theoretical distinction – and aided by a considerable increase in the amount of data under investigation in the world sample – we model the effect of electoral systems on real prices using the linear generalized estimating equation (GEE) method for a continuous dependent variable. This approach was originally set forth by Liang and Zeger (1986) and reviewed for applications in political science by Zorn (2001).[12]

The GEE method estimates the marginal effects of a series of co-variates on a dependent variable that is known to have clusters of correlated or repeated observations – here, real price levels that are correlated within countries over time.

[12] Concerning the differences between models of "conditional" effects such as OLS and models of "marginal" effects such as GEE, Agresti (2002) provides a particularly helpful discussion; see pp. 466–476 and 500–502.

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It also permits the explicit modeling of time-dynamics of the dependent variable within each country. Because it is impossible, due to data limitations, to estimate precisely how prices are correlated within countries, over time,[13] we follow standard practice in positing and estimating the parameters of a series of simpler "working" correlation structures. We then assess each model's efficiency and success at fitting the data.[14] We find that assuming exchangeability in the across-year correlation structure produces the best model. This means that each year's real price levels are assumed to be correlated equally with every other year's real price levels for every given country.[15] The correlation parameter σ is estimated as part of fitting the model.

Figure 4.2 illustrates the GEE model as applied to the simpler bivariate relationship between real price levels and the square root of per capita GDP. Each thin line represents the OLS fit for one country to the within-country observations for these two variables. Very few of these lines – particularly

[13] The maximum number of years observed for each country is 29. A correlation matrix of yearly prices is symmetric, so to estimate a 29-year-by-29-year correlation matrix would require estimating 406 pairwise correlation parameters. We do not have nearly enough data to estimate reliably this many parameters.

[14] For each working model, we estimate both naïve and robust standard errors to evaluate alternate correlation structures. In GEE models, robust standard error estimates are consistent even if the assumed working correlation structure is erroneous (Diggle, Liang, and Zeger 1994).

[15] Rejected correlation structures include an autocorrelation model (about which we say more later) and a multiple-period stationarity model.

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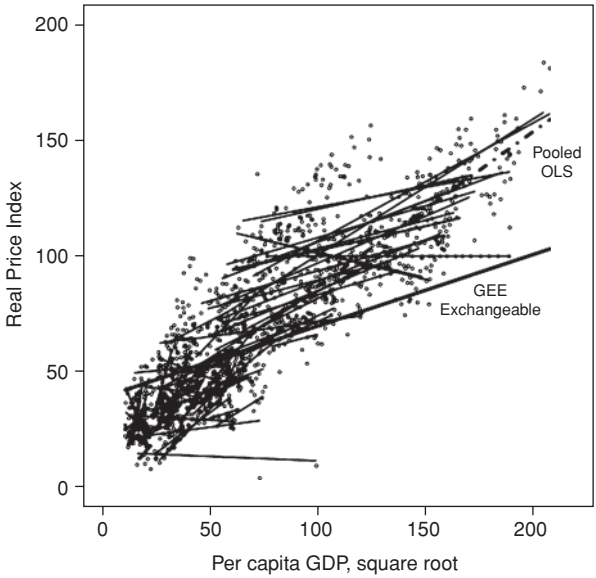

Figure 4.2. Scatterplot of real price levels against square root transformed per capita GDP in democracies in the Polity IV data set, 1972–2000. Each point represents one country-year. The scatterplot is overlaid with three types of best-fit lines, for the bivariate relationship. The multiple thin solid lines are the within-country linear fits; these lines span the length of the observed range of per capita GDP in each respective country. The thick dashed line is the pooled OLS best fit, ignoring the within-country correlation of real price levels across time. The thick solid line is the GEE best fit, assuming an exchangeable correlation structure.

at the low end of per capita GDP, where countries exhibit little over-time variation – run parallel to the pooled ordinary least squares best fit line. This reveals significant cross-country heterogeneity but also shows that the pooled OLS

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fit, which wrongly assumes that all observations are independent, is overestimating the actual effect of per capita GDP on real price levels. A better estimate of the relationship between these variables is given by the linear GEE model assuming an exchangeable within-country correlation structure, which runs visibly parallel to many more of the within-country fits.

In Table 4.2, the baseline model gives the results from estimating the linear exchangeable GEE model as specified earlier. Note that in all of the models, the signs on the control variables are as expected. The effect of having a majoritarian electoral system is estimated to decrease real price levels by approximately two points on the price index. This estimate is slightly higher and statistically significant at the 2 percent level in the Freedom House data set, and slightly lower and statistically significant at the 6 percent level in the Polity IV data set.

To test whether this electoral system effect is being driven by the experience of the world's wealthiest democracies, we next add an interaction between the electoral system and GDP variables to the model. We find no statistically significant interaction effect, and in substantive terms, the estimated effect is nearly zero. In the Polity IV data, the model finds some attenuation in the electoral system effect in poorer democracies that does not appear in the Freedom House data. But in both data sets, the overall significance of electoral systems remains the same. The long-term decrease in price levels

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Table 4.2. Linear GEE models, assuming exchangeability; robust standard errors in parentheses. Dependent variable is real price level. Models labeled "No mixed ES" exclude democratic country-years with mixed majoritarian-proportional electoral systems. Models labeled "Imputed" are results from averaging more than ten GEE models fit to imputed data sets; all other models employ listwise deletion. Per capita GDP has been re-centered in models other than Baseline to maintain a consistent interpretation of its coefficient estimate

	Freedom House				Polity IV			
	Baseline	**Interaction**	**No mixed ES**	**Imputed**	**Baseline**	**Interaction**	**No mixed ES**	**Imputed**
Majoritarian electoral system	−2–236	−2.241	−3–475	−2.020	−1.705	−1.604	−2.944	−2.207
	(0.919)	(0.898)	(0.965)	(1.103)	(0.911)	(0.910)	(1.013)	(0.914)
Lagged real prices	0.744	0.745	0.735	0.576	0.690	0.689	0.674	0.698
	(0.047)	(0.047)	(0.052)	(0.073)	(0.048)	(0.048)	(0.053)	(0.046)
Per capita GDP (square root)	0.105	0.105	0.110	0.202	0.144	0.149	0.159	0.141
	(0.030)	(0.031)	(0.035)	(0.048)	(0.032)	(0.033)	(0.037)	(0.030)
Change in exchange rates	−8.825	−8.826	−8.581	−8.059	−6.862	−6.832	−6.621	−6.939
(plus 0–3, natural log)	(1.768)	(1.779)	(1.764)	(1.663)	(1.470)	(1.477)	(1.496)	(1.441)
Population (natural log)	−0.918	−0.919	−0.961	−0.908	−1.408	−1.393	−1.596	−0.954
	(0.394)	(0.392)	(0.449)	(0.657)	(0.475)	(0.483)	(0.592)	(0.459)

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Imports as a percent of GDP	−0.170	−0.170	−0.175	−0.170	−0.211.	−0.211	−0.223	−0.164
	(0.040)	(0.041)	(0.044)	(0.048)	(0.046)	(0.047)	(0.053)	(0.045)
U.S. inflation rate	0.696	0.696	0.691	1.198	0.854	0.858	0.867	0.874
	(0.155)	(0.155)	(0.162)	(0.228)	(0.169)	(0.169)	(0.178)	(0.166)
SMD × GDP (square root)		0.001	−0.024	0.009		−0.013	−0.047	−0.005
		(0.020)	(0.019)	(0.029)		(0.021)	(0.021)	(0.020)
Constant	20.060	28.108	30.115	37.295	30.956	41.306	46.384	31.706
	(8.444)	(9.992)	(11.210)	(14.248)	(9.667)	(11.334)	(13–37)	(10.441)
Observations	1410	1410	1299	1652	1389	1389	1247	1459
ρ	0.247	0.247	0.279	0.295	0.289	0.286	0.344	0.230
Long-term SMD effect	−11.9%	−11.9%	−17.9%	−6.9%	−7.9%	−7.4%	−13.0%	−10.7%

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attributable to a majoritarian electoral system is 12 percent in the Freedom House data set and 8 percent in the Polity IV data set.[16]

When countries employing mixed majoritarian-proportional electoral systems are excluded from the analysis, the electoral system effect becomes even more pronounced. Our initial coding rule partitioned mixed-system democracies according to whether they were more similar to pure majoritarian or proportional electoral systems. Yet, recall that the primary objective of our electoral system measure is to approximate seats-votes elasticity. Dividing up democracies that have more complex – and less well-understood – mixed systems in this manner may therefore introduce some measurement error into the analysis. In the models with mixed system democracies dropped, the estimated electoral system effect increases in significance to between three and three-and-a-half points, with a long-term effect of between 13 and 18 percent. Negative coefficients on the electoral system-wealth interaction term, indicating attenuation in the electoral system effect in poorer democracies, are now apparent in both data sets (although only statistically significant among the Polity IV countries). Holding all other control variables

[16] These values are for countries with average levels of wealth in the respective data sets. Long-term shifts are calculated as $\beta_{SND}/(1-\beta_{iagn}))/\bar{p}$, where $\bar{p} = 73.42$ is the mean price level in the *Freedom House* data set and $\bar{p} = 69.29$ is the mean price level in the *Polity IV* data set.

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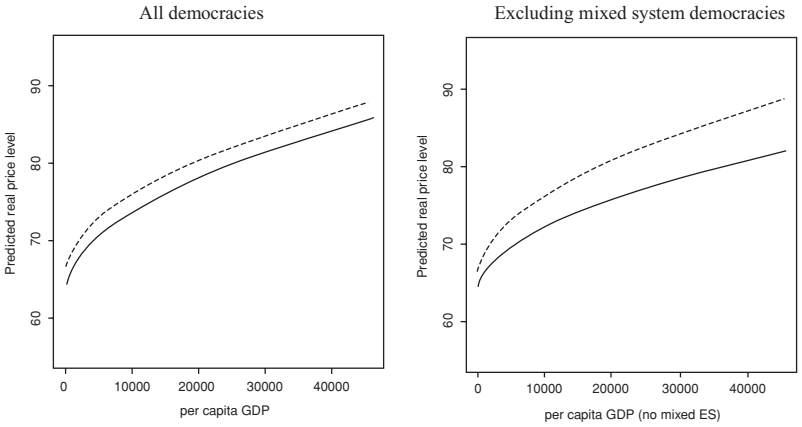

Figure 4.3. Predicted real price levels for democracies with majoritarian electoral systems (solid line) and proportional electoral systems (dashed line) at varying levels of per capita GDP. Using the results of the interaction (left) and no mixed ES (right) models in the Freedom House data set. All other control variables are held constant at their mean.

at their mean, however, this attenuation is not so great as to reverse the electoral system effect in less-wealthy democracies (Figure 4.3).

Each of our models thus far has employed listwise deletion, removing from the analysis all observations that contain missing values on either the dependent variable or any of the independent variables.[17] We guard against the potential

[17] The overall rate of missingness across these seven variables is 4.4% in the *Freedom House* data and 1% in the *Polity IV* data. Among only the dependent variable, real price levels, the rate of missingness in these two data sets is 13.2% and 3%, respectively.

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for selection bias arising from this practice by applying the multiple imputation algorithm implemented in the software package Amelia II (Honaker, King, and Blackwell 2010; King, Honaker, Joseph, and Scheve 2001). The concern over bias is particularly acute in our analysis because 1) the variable measuring real price levels contains the most missing values; 2) poorer countries have more missing observations than wealthy countries; and 3) wealth is the primary known determinant of real price levels. The results of model-averaging the exchangeable GEE model across ten imputed data sets are given in the models labeled "imputed." The potential for bias resulting from nonrandomly missing observations is not realized. The magnitude of the coefficient on electoral system increases in the Polity IV model and decreases in the Freedom House model, but remains statistically significant at the 2 percent and 10 percent levels, respectively. These coefficients also remain well within the range of the nonimputed model coefficients, given the standard errors of both.

The preceding models have all sought to estimate the aggregate effect of majoritarian versus proportional electoral rules on real price levels between 1972 and 2000. We now test for the possibility that this aggregate effect might have arisen from the averaging out of otherwise irregular yearly shifts in price levels, with prices higher in some years under proportional electoral rules, and in other years (contrary to our theory) under majoritarian electoral rules. From Figure 4.1, it

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is not immediately apparent whether the posited electoral system effect increased, decreased, or remained constant during the time period under investigation. To address this question, we add two sets of year fixed-effects to the interaction model, one each for majoritarian and proportional democracies. The predicted yearly difference in price levels between the two electoral systems, once the effects of the other explanatory variables have been controlled for, can then be directly calculated from the coefficients on the electoral system dummy variable and the year-electoral system fixed effects.[18]

The results from this model confirm that higher real price levels are a persistent year-to-year feature of proportional democracies when compared to majoritarian democracies. All else equal, price levels are estimated to be lower in majoritarian democracies in twenty-one out of twenty-eight years in the Freedom House data and twenty out of twenty-eight

[18] Specifically, using 1973 as the reference year, the model is:

$$\begin{aligned} \textit{Price Level} = \beta_0 &+ \beta_1 SMD + \beta_2 SMD \times Year_{1974} + \beta_3 PR \times Year_{1974} \\ &+ \beta_4 SMD \times Year_{1975} + \beta_5 PR \times Year_{1975} \\ &+ \cdots + \sum \beta_j \textit{Other controls} + \varepsilon. \end{aligned}$$

Thus, for example, holding constant the control variables, the electoral system effect for 1974 is equal to $\beta_1 + \beta_2 - \beta_3$. The variance of this estimate is $\text{Var}(\beta_1) + \text{Var}(\beta_2) + \text{Var}(\beta_3) - 2(\text{Cov}(\beta_1; \beta_2) - \text{Cov}(\beta_1; \beta_2) - \text{Cov}(\beta_2; \beta_3))$. Because the variable measuring U.S. inflation rate is country-invariant in any given year, it is left out of this model due to its perfect collinearity with the year dummy variables.

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years in the Polity IV data.[19] Although only a third of the yearly differences are statistically significant in the predicted direction at the 5 percent level, the number of observations per year is also typically quite low, ranging from just thirty-one to eighty. The average yearly difference is around two and a quarter index points.

The five-year moving average in Figure 4.4 reveals that the electoral system effect first shrank when prices in proportional democracies fell in the early 1980s, and then shrank again more gradually throughout the 1990s following an increase in the late 1980s.[20] Although we find this over-time phenomenon extremely interesting from a substantive perspective, we offer no particular explanation for it.

Conclusion

This chapter has provided the strongest evidence so far supporting the relationship theorized previously linking majoritarian electoral institutions to lower real prices among democracies worldwide. In so doing, the chapter also lends additional empirical support to the preceding foundational theory of Stigler (1971) and Peltzman (1976).

[19] It is not twenty-nine years because 1972 is dropped; as the earliest year in the data set, it contains no observed value of the lagged dependent variable.

[20] This trend is less apparent in the noisier, untransformed year-to-year estimates.

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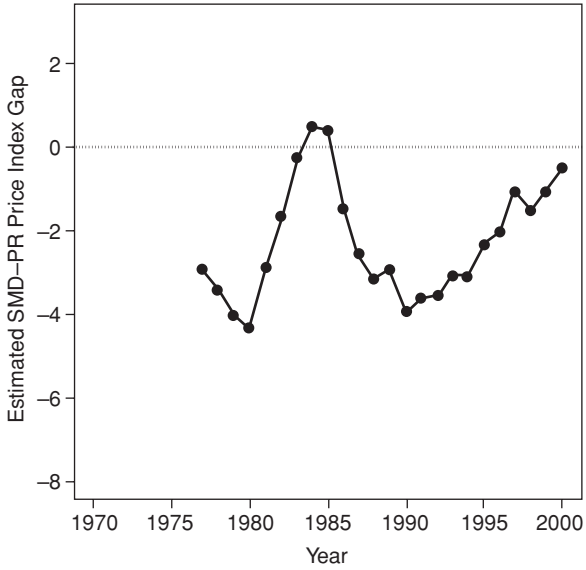

Figure 4.4. Yearly estimated difference in real price levels between majoritarian and proportional democracies in Polity IV data set, after controlling for GDP, changes in the exchange rate, population, and import levels: five-year moving average.

The value of this result is heightened due to the plausible reasons why the electoral system effect might not hold – or possibly even be reversed – in less-wealthy democracies. The original model captured key elements of the electoral linkage between voter preferences and regulatory output. In particular, majoritarian electoral systems that privilege consumers' over producers' preferences were expected to generate economic policy that favored consumers. But if, due to diminished state capacity, legislative action was a poor

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reflection of voter preference, then it would not be surprising to observe no electoral system effect in poorer democracies. Alternately, if legislators did regulate to favor consumers, but consumers preferred an appreciated exchange rate rather than a lower purchasing power parity – a logical response to living in a country whose economy depends on production almost entirely for export – then we would observe majoritarian electoral systems actually leading to higher real price levels. Neither of these turns out to be the case. The electoral system effect, while attenuated in poorer democracies, is never reversed.

Appendix
Countries and Years in Freedom House Data Set

The Freedom House data set is the population of countries and years identified as democratic by receiving a Freedom House "political rights" score of one or two between 1972 and 2000. Country-years corresponding to countries with very brief (only one or two years at a time) spells of democracy, and/or five or fewer total years of democratic government are not included. For electoral systems, SMD indicates single-member district majoritarian democracies; PR indicates multimember district proportional democracies; and, if labeled, Mixed indicates mixed systems. For each country, the total

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number of years of democracy included in our analysis from 1972 to 2000 is given in parenthesis.

Andorra (8): PR 1993–2000
Antigua and Barbuda (9): SMD 1981–1989
Argentina (17): PR 1973–1975, PR 1984–1997
Australia (29): SMD 1972–2000
Austria (29): PR 1972–2000
Bahamas (28): SMD 1973–2000
Bangladesh (7): SMD 1991–1994, SMD 1996–1998
Barbados (29): SMD 1972–2000
Belgium (29): PR 1972–2000
Belize (20): SMD 1981–2000
Benin (10): PR 1991–2000
Bolivia (20): PR 1981–1995, PR (Mixed) 1996–2000
Botswana (28): SMD 1973–2000
Brazil (10): PR 1986–1992, PR 1994–1996
Bulgaria (10): PR 1991–2000
Canada (29): SMD 1972–2000
Cape Verde (10): PR 1991–2000
Chile (8): PR 1990–1997
Colombia (20): PR 1972–1988, PR 1991–1993
Costa Rica (29): PR 1972–2000
Cyprus (20): PR 1981–2000
Czech Republic (8): PR 1993–2000

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Denmark (29): PR 1972–2000

Dominica (23): SMD 1978–2000

Dominican Republic (18): PR 1978–1992, PR 1998–2000

Ecuador (18): PR 1979–1996

El Salvador (8): PR 1972–1975, PR 1997–2000

Estonia (6): PR 1995–2000

Fiji (15): SMD 1972–1986

Finland (29): PR 1972–2000

France (29): SMD 1972–1985, PR 1986–1987, SMD 1988–2000

Gambia, The (14): SMD 1972–1980, SMD 1989–1993

Germany (29): PR (Mixed) 1972–2000

Greece (27): PR 1974–2000

Grenada (21): SMD 1974–1978, SMD 1985–2000

Guyana (8): PR 1993–2000

Honduras (9): PR 1984–1992

Hungary (11): PR (Mixed) 1990–2000

Iceland (29): PR 1972–2000

India (24): SMD 1972–1990, SMD 1996–2000

Ireland (29): PR 1972–2000

Israel (29): PR 1972–2000

Italy (29): PR 1972–1992, SMD (Mixed) 1993–2000

Jamaica (29): SMD 1972–2000

Japan (29): PR 1972–1992, SMD (Mixed) 1993–2000

Kiribati (23): PR 1978–2000

Korea, South (13): SMD (Mixed) 1988–2000

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Latvia (6): PR 1995–2000
Liechtenstein (9): PR 1992–2000
Lithuania (10): SMD 1991, SMD (Mixed) 1992–2000
Luxembourg (29): PR 1972–2000
Madagascar (8): PR 1993–1997, PR (Mixed) 1998–2000
Malta (29): PR 1972–2000
Marshall Islands (10): SMD 1991–2000
Mauritius (23): PR 1977–1979, PR 1981–2000
Micronesia (10): SMD 1991–2000
Monaco (8): PR 1993–2000
Mongolia (8): PR 1993–1995, SMD 1996–2000
Namibia (11): PR 1990–2000
Netherlands (29): PR 1972–2000
New Zealand (29): SMD 1972–1993, PR (Mixed) 1994–2000
Norway (29): PR 1972–2000
Palau (7): SMD 1994–2000
Panama (7): PR (Mixed) 1994–2000
Papua New Guinea (25): SMD 1976–2000
Peru (10): PR 1980–1989
Philippines (9): SMD (Mixed) 1987–1989, SMD (Mixed) 1995–2000
Poland (11): SMD 1990, PR 1991–2000
Portugal (25): PR 1976–2000
Samoa (12): PR 1989–2000
San Marino (14): PR 1972–1976, PR 1992–2000
Sao Tome and Principe (10): PR 1991–2000

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Slovakia (7): PR 1994–2000
Slovenia (10): PR 1991–2000
Solomon Islands (22): SMD 1978–1999
South Africa (7): PR 1994–2000
Spain (24): PR 1977–2000
Sri Lanka (9): SMD 1972–1977, PR 1978–1980
St. Kitts and Nevis (20): SMD 1981–2000
St. Lucia (22): SMD 1979–2000
St. Vincent and Grenadines (22): SMD 1979–2000
Sweden (29): PR 1972–2000
Switzerland (29): PR 1972–2000
Trinidad and Tobago (29): SMD 1972–2000
Turkey (10): PR 1973–1979, PR 1990–1992
United Kingdom (29): SMD 1972–2000
United States (29): SMD 1972–2000
Uruguay (16): PR 1985–2000
Vanuatu (21): PR 1980–2000
Venezuela (23): PR 1972–1988, PR (Mixed) 1989–1991, PR (Mixed) 1996–1998

Countries and Years in Polity IV Data Set

The Polity IV data set is the population of countries and years identified as democratic by receiving a Polity IV "combined polity score" greater than or equal to six between 1972 and 2000. Country-years corresponding to countries with very

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brief (only one or two years at a time) spells of democracy, and/or five or fewer total years of democratic government are not included. For electoral systems, SMD indicates single-member district majoritarian democracies; PR indicates multimember district proportional democracies; and, if labeled, Mixed indicates mixed systems. For each country, the total number of years of democracy included in our analysis from 1972 to 2000 is given in parentheses.

Argentina (21): PR 1973–1975, PR 1983–2000
Australia (29): SMD 1972–2000
Austria (29): PR 1972–2000
Bangladesh (10): SMD 1991–2000
Belgium (29): PR 1972–2000
Benin (10): PR 1991–2000
Bolivia (19): PR 1982–1995, PR (Mixed) 1996–2000
Botswana (29): SMD 1972–2000
Brazil (16): PR 1985–2000
Bulgaria (11): PR (Mixed) 1990, PR 1991–2000
Canada (29): SMD 1972–2000
Chile (12): PR 1989–2000
Colombia (29): PR 1972–2000
Costa Rica (29): PR 1972–2000
Cyprus (29): PR 1972–2000
Czech Republic (11): PR 1990–2000
Denmark (29): PR 1972–2000

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Dominican Republic (21): PR 1978–1993, PR 1996–2000
Ecuador (22): PR 1979–2000
El Salvador (17): PR 1984–2000
Estonia (10): PR 1991–2000
Fiji (15): SMD 1972–1986
Finland (29): PR 1972–2000
France (29): SMD 1972–1985, PR 1986–1987, SMD 1988–2000
Gambia, The (22): SMD 1972–1993
Germany (29): PR (Mixed) 1972–2000
Greece (26): PR 1975–2000
Guyana (9): PR 1992–2000
Honduras (15): PR 1982–1984, PR 1989–2000
Hungary (11): PR (Mixed) 1990–2000
India (29): SMD 1972–2000
Ireland (29): PR 1972–2000
Israel (29): PR 1972–2000
Italy (29): PR 1972–1992, SMD (Mixed) 1993–2000
Jamaica (29): SMD 1972–2000
Japan (29): PR 1972–1992, SMD (Mixed) 1993–2000
Korea, South (13): SMD (Mixed) 1988–2000
Latvia (10): SMD 1991, PR 1992–2000
Lithuania (10): SMD 1991, SMD (Mixed) 1992–2000
Macedonia (10): SMD (Mixed) 1991–2000
Madagascar (9): PR 1992–1997, PR (Mixed) 1998–2000
Malawi (7): SMD 1994–2000

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Mali (9): PR 1992–2000

Mauritius (29): PR 1972–2000

Moldova (8): PR 1993–2000

Mongolia (9): PR 1992–1995, SMD 1996–2000

Mozambique (7): PR 1994–2000

Namibia (11): PR 1990–2000

Netherlands (29): PR 1972–2000

New Zealand (29): SMD 1972–1993, PR (Mixed) 1994–2000

Nicaragua (11): PR 1990–2000

Norway (29): PR 1972–2000

Pakistan (15): SMD 1973–1976, SMD 1988–1998

Panama (12): PR (Mixed) 1989–2000

Papua New Guinea (26): SMD 1975–2000

Paraguay (9): PR 1992–2000

Peru (12): PR 1980–1991

Philippines (14): SMD (Mixed) 1987–2000

Poland (10): PR 1991–2000

Portugal (25): PR 1976–2000

Slovakia (8): PR 1993–2000

Slovenia (10): PR 1991–2000

Solomon Islands (22): SMD 1978–1999

South Africa (7): PR 1994–2000

Spain (23): PR 1978–2000

Sri Lanka (10): SMD 1972–1977, PR 1978–1981

Sweden (29): PR 1972–2000

Switzerland (29): PR 1972–2000

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Thailand (9): PR 1992–1996, SMD (Mixed) 1997–2000
Trinidad and Tobago (29): SMD 1972–2000
Turkey (25): PR 1973–1979, PR 1983–2000
Ukraine (10): SMD 1991–1992, PR (Mixed) 1993–2000
United Kingdom (29): SMD 1972–2000
United States (29): SMD 1972–2000
Uruguay (16): PR 1985–2000
Venezuela (29): PR 1972–1988, PR (Mixed) 1989–1998, PR 1999–2000

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