B.J.Pol.S. **37,** 000–000 *Copyright © 2007 Cambridge University Press*
doi:10.1017/S0000000000000000 *Printed in the United Kingdom*

Notes and Comments

Electoral Systems and Real Prices: Panel Evidence for the OECD Countries, 1970–2000

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In a recent article, Rogowski and Kayser introduced a claim to the political economy literature that majoritarian electoral systems: (a) systematically privilege consumers relative to producers and, consequently, (b) reduce real prices.[1] The authors, modifying an established model of regulation, showed that, within a competitive political system, politicians favour those who provide only votes (consumers) over those who provide both money and votes (producers). When producers provide only money, the intuition becomes apparent even without a model: politicians respond more to voters under (majoritarian) systems in which a small change in vote share can produce a large change in seat share. Cross-sectional evidence for the OECD (Organization for Economic Co-operation and Development) countries in 1990 was strongly supportive, suggesting that real prices were, all else equal, about 10 per cent lower in the average OECD country with single-member district (SMD) electoral systems than in those that used some form of proportional representation (PR).

As with all new empirical claims, healthy scepticism is warranted. Indeed, recent research in related areas has to be contrasted with – but it has not contradicted – these price results, associating proportional electoral arrangements with more positive social welfare outcomes including (a) less income inequality,[2] (b) higher public spending,[3] or, in combination with central banking institutions, (c) greater price stability.[4] We acknowledge the possible incongruity of these results with those of

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[1] Ronald Rogowski and Mark Andreas Kayser, 'Majoritarian Electoral Systems and Consumer Power: Price-Level Evidence from the OECD Countries', *American Journal of Political Science*, 46 (2002), 526–39.

[2] David Austen-Smith, 'Redistributing Income under Proportional Representation', *Journal of Political Economy*, 108 (2000), 1235–69; and Vicki Birchfield and Markus M. L. Crepaz, 'The Impact of Constitutional Structures and Collective and Competitive Veto Points on Income Inequality in Industrialized Democracies', *European Journal of Political Research*, 34 (1998), 175–200.

[3] Torsten Persson and Guido Tabellini, *The Economic Effects of Constitutions* (Cambridge, Mass.: The MIT Press, 2003); Gian Maria Milesi-Ferretti, Roberto Perotti and Massimo Rostagno, 'Electoral Systems and the Composition of Public Spending', *Quarterly Journal of Economics*, 117 (2002), 609–57.

[4] Philip Keefer and David Stasavage, 'The Limits of Delegation, Veto Players, Central Bank Independence, and the Credibility of Monetary Policy', *American Political Science Review*, 97 (2003), 407–23.

Rogowski and Kayser;[5] after all, verification of the price effects would suggest a more complicated relationship between electoral institutions and social welfare than is indicated in the extant literature. Electoral systems may have several inconsistent effects on social welfare, each of which must be traced out before aggregate results such as income inequality or social welfare can fully be understood.

Rogowski and Kayser, in truth, only demonstrated the plausibility of a novel idea with profound consequences for the social welfare implications of institutional design;[6] their empirical analysis, though intriguing, is certainly not compelling, leaving unaddressed questions of mechanism and dynamics in the relationship between electoral systems and real prices. Purely cross-sectional evidence simply cannot be conclusive on such substantively important issues. Despite the indirect corroboration of findings such as Scartascini, that countries with majoritarian electoral systems have lower barriers to business entry,[7] or Pagano and Volpin, that PR privileges entrepreneurs and employees over unorganized groups,[8] a critical reader must find the direct evidence wanting.[9] The relationship observed between electoral systems and prices in Rogowski and Kayser could prove anomalous, spurious, or unfounded for too many reasons.[10]

First, the observed effect might prevail only in 1990, the single year observed. The year 1990, for example, witnessed the beginning of a recession in a considerably larger proportion of majoritarian countries, including Australia, Canada, Britain and the United States, than proportional countries.[11] Depressed domestic demand could have diminished both components of real prices – nominal price baskets (PPP) and the exchange rate – yet, obviously, only a control for the latter could be included. Another anomalous event of 1990 was the first Gulf War. Might large military deployments have had distinct economic effects in those countries – all majoritarian: the United States, Britain and France – that made the largest military commitments? Additionally, might the spike in oil prices from the anticipation and prosecution of the first Gulf War have raised prices less in OECD countries with domestic oil sources, which may have been disproportionately majoritarian (The United States, Britain and Canada) rather than proportional (Norway, The Netherlands)? It is even possible that the Plaza Accord of 1985, which succeeded by 1990 in driving down the value of the dollar, may have affected prices in majoritarian countries differently from those in proportional countries. Any one of these possible anomalies would suffice to draw the reliability of conclusions founded on a 1990 cross section into question.

Secondly, cross-sectional data cannot rule out a more enduring spurious relationship between electoral systems and real prices. Cross nationally, countries with majoritarian and proportional systems exhibit systematic differences in many characteristics. 'Majoritarian electoral systems', for example, might simply be an instrument for 'British colonial heritage' – an influence that, together with its liberal market ideals, might explain both electoral arrangements and price levels. Panel data, such as those introduced here, permit fixed-effect models that absorb country-specific influences

[5] Rogowski and Kayser, 'Majoritarian Electoral Systems and Consumer Power.

[6] Rogowski and Kayser, 'Majoritarian Electoral Systems and Consumer Power.

[7] Carlos Scartascini, 'Political Institutions and Regulation: An Inquiry on the Impact of Electoral Systems on the Regulation of Entry' (Working Paper, Inter-American Development Bank, 2002).

[8] Marco Pagano and Paolo Volpin, 'The Political Economy of Corporate Governance', *American Economic Review*, 95 (2005), 1005–30.

[9] Relatedly, Hall, Iversen, Soskice, Estevez-Abe and others (in Peter Hall and David Soskice, eds, *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage* (Oxford: Oxford University Press, 2001) have argued cogently that PR is the linchpin of an 'organized market economy' characterized by anti-competitive mechanisms, and that these structures are so intermeshed with educational, labour-market and political institutions as to be almost impervious to change. William W. Lewis, *The Power of Productivity: Wealth, Poverty, and the Threat to Global Stability* (Chicago: University of Chicago Press, 2004), establishes the importance of competition and retail-sector efficiency for overall growth of productivity and income.

[10] Rogowski and Kayser, 'Majoritarian Electoral Systems and Consumer Power.

[11] National Bureau for Economic Research (www.nber.org) and Economic Cycle Research Institute (www.businesscycle.com/pdfs/0012-businessChron.PDF).

not articulated in the earlier specifications, and thereby assuage concerns about omitted variables. The implicit 'natural experiments' of countries that switched electoral systems, but little else, during the panel period should similarly allay scepticism about such omitted variables. Intertemporally, panel data with country fixed-effects can exploit the natural experiments of electoral system change within countries while controlling for all cross-national effects. Such insights cannot be attained with cross-sectional data as used in Rogowski and Kayser, nor can their data control for slow-changing or immutable national features.

Finally, and perhaps most importantly, by failing to test their mechanism more fully, Rogowski and Kayser are unable to preclude rival hypotheses. Characteristics of electoral systems other than seats–votes elasticities might affect regulatory incentives, and consequently real price levels. Consider two alternative mechanisms, un-theorized and untested in Rogowski and Kayser:[12] differences in (a) campaign finance – state funding and limits on campaign spending may alter politicians' incentives and responsiveness to organized producers – and (b) clarity of governmental responsibility[13] – voters hold governments more responsible for changes in their real income and purchasing power when they are able to associate parties with policies clearly. Without considering these two potential confounding factors, Rogowski and Kayser might misleadingly demonstrate a spurious association between electoral systems and price levels.[14] In this Note we subject the hypothesis of Rogowski and Kayser to more rigorous empirical scrutiny employing panel data for twenty-three OECD countries over the period 1970–2000.[15]

We forgo here any extensive recapitulation of the theoretical model that underlies the Rogowski and Kayser article, summarizing instead its basic approach, intuitions and empirical implications.[16] As in the original Stigler–Peltzman model,[17] Rogowski and Kayser assume a basic opposition between consumers and producers, the former seeking the lowest possible prices, the latter profit-maximizing, i.e. monopolistic, prices. 'Producers' explicitly include, in any given sector, organized workers, who can hold their wages above market levels only if their employers extract monopolistic rents. In essence, the model assumes a coalition of each sector's workers and owners against its consumers. Government regulation can award producers the higher prices they seek, usually by restricting supply (for example, by limiting the number of 'medallions', New York City keeps taxicab fares high; and licensing restrictions sustain higher fees for physicians, estate agents, lawyers, beauticians, pharmacists, and many others).

In deciding how much to restrict supply, the model assumes that politicians implicitly measure the *marginal rate of substitution* (MRS) between consumer and producer support: where even a slight decrease in consumer support would require a large increase in producer support to keep a politician's overall level of support unchanged, consumers are powerful (and prices will be low); where a slight decrease in producer support must be offset by a large increase in consumer support, producers are powerful (and prices will be high). Rogowski and Kayser showed formally that any institutional change that increased the marginal value of votes must move the MRS in a more pro-consumer (hence, lower-price) direction. Since majoritarian electoral systems normally increased the marginal value of votes, or more precisely the impact of a vote change on the allocation of parliamentary seats (the *seats–votes elasticity*), majoritarian systems should be

[12] Rogowski and Kayser, 'Majoritarian Electoral Systems and Consumer Power.

[13] G. Bingham Powell, *Elections as Instruments of Democracy: Majoritarian and Proportional Visions* (New Haven, Conn.: Yale University Press, 2000).

[14] Rogowski and Kayser, 'Majoritarian Electoral Systems and Consumer Power'.

[15] Electoral systems, as we capture in our data, have changed in several countries. Note shifts from SMD to PR in France (1986) and New Zealand (1994); and from PR to SMD (or predominantly SMD) in France (1988), Italy (1993) and Japan (1994).

[16] The full specification of the model is of course available in Rogowski and Kayser, 'Majoritarian Electoral Systems and Consumer Power', pp. 527–31.

[17] Sam Peltzman, 'Toward a More General Theory of Regulation', *Journal of Law and Economics*, 19 (1976), 211–40.

more pro-consumer.[18] All else equal, under a majoritarian electoral system politicians (a) perceive votes as more valuable, relative to money, hence (b) understand that more producer support will be required to offset any decline in consumer support, and (c) tilt their regulatory decisions against restrictive regulation and hence towards low prices. The implication should hold cross-sectionally and intertemporally, i.e.: (a) controlling for other factors, countries with majoritarian electoral systems will have lower prices, and (b) countries that *change* from PR to majoritarian electoral systems will decrease their average price levels.

These predictions should hold true because it is precisely where voters are empowered that market competition should be most unfettered. Consider the incentives of both legislators and voters under the present mechanism. Legislators respond to both money and votes in optimizing their probability of retaining office. Barring systematic differences in campaign finance across electoral systems – a rival hypothesis that we test and reject – systems that magnify the effect of even small swings in the vote on the incumbent party's seat share should tilt the balance of legislators' (and their regulatory agents') attentions in favour of consumers and, hence, competition. Although organized producers – among them union members – also contribute votes, any institutional arrangement that increases the effect of a single factor will increase the influence of the group that provides only that factor. Voters, for their part, are perceived by legislators and probably do respond to the improved purchasing power provided by a reduction in real prices by rewarding incumbents.[19] A majoritarian electoral system is thus likelier, at the margin, to produce pro-consumer, low-price policies, while a proportional system is likelier, also at the margin, to enact pro-producer, high-price policies.

Increasingly, politicians, policy experts, advocates and opponents of economic reforms perceive this same link. In Germany's efforts to reform its exceptionally troubled system of local monopolies (such as bakeries), cross-ownership of shares, highly restrictive retail hours and labour-market rigidities, advocates of change have come increasingly to see the PR electoral system as a major obstacle.[20] In Italy, the introduction of a predominantly majoritarian electoral system presaged the abolition of a slew of competition-limiting legislation;[21] and in New Zealand, the radical economic reforms of the 1980s were made possible by an SMD system and – again, in the view of advocates of reform – have been halted or actually reversed by the switch to a PR system.

As a necessary prologue to the data analysis, we next consider issues of measurement and of model specification.

HOW TO MEASURE, AND COMPARE, PRICE LEVELS CROSS-NATIONALLY AND OVER TIME

The standard measurement in the literature for comparing price levels cross-nationally is known as 'purchasing power parity over exchange rate', or for short 'PPP/XR'. The International Comparisons Project (ICP) that produces the Penn World Tables, regularly compiles a price index that compares national measures of PPP/XR with respect to broad 'baskets' of goods and services,

[18] Under strict proportional representation, the seats–votes elasticity – the percentage increase in party's parliamentary seats achieved by a 1 per cent increase in its vote share – is everywhere 1. Under the typical single-member district (SMD) majoritarian system, when two parties each achieve 50 per cent of the popular vote, the seats–votes elasticity is about 2.5, i.e. an increase from 50 to 51 per cent of the popular vote will raise a party from 50 to about 52.5 per cent of the parliamentary seats. Where one party achieves an overwhelming majority of the popular vote, where vote swings are limited by ethnic or religious solidarity or where consensual gerrymandering maximizes the number of safe districts, SMD can have a *lower* seats–votes elasticity than PR.

[19] Indeed, the success of increasingly precise measures of voter welfare such as real disposable income – i.e, income adjusted for inflation and net of taxes – in predicting election outcomes Larry M. Bartels and John Zaller, 'Presidential Vote Models: A Recount', *PS: Political Science & Politics*, 34 (2001), 9–20, suggest that politicians may be correct in assigning great weight to the material welfare of their constituents.

[20] Jörn Quitzau, 'Is Germany Heading the Same Way as Japan?' *Frankfurt Voice* (Deutsche Bank Research, 2002).

[21] See 'A Logjam Breaks: Deregulation in Italy', *The Economist*, 5 August 2006.

of the kind that are familiar from calculations of consumer price indices. If the broadest possible 'basket', representing all of the goods and services that a typical economy might consume, costs (let us say) €5,000 in Italy but $3,000 in the United States, while the euro–dollar exchange rate is 1:1, then we can say that the overall price level in Italy is 5/3, or 1.6 times, what it is in the United States.[22]

In theory, any substantial cross-national price differences should be quickly arbitraged away, and hence real prices for identical goods should be the same everywhere: this is the well-known 'Law of One Price' (LOP). In practice, as a considerable literature shows, the LOP obtains only in highly attenuated form.[23] Several factors have long been understood, empirically if not theoretically, to make for persistent differences in price levels.

Foremost among these is *wealth*, usually measured as real gross domestic product (GDP) per capita. Richer countries, independent of other plausible factors, have higher real prices, a result that is robust across virtually every possible specification. Wealth, indeed, consistently emerges as the most important single determinant of national price levels, even when one controls for the two most commonly imputed causes,[24] namely (a) differences in productivity between traded and nontraded sectors,[25] and (b) cross-national differences in capital/labour ratios.[26]

Secondly, there are obvious *natural, cultural and policy barriers* to arbitrage. Our general prior assumption here is that economies that are less open – whether because of physical isolation, idiosyncratic or xenophobic tastes, or their governments' isolationist tendencies – will be better able to maintain prices above world levels. Our overall measure is simply imports as a share of GDP, and we anticipate that – again, all else equal – greater openness entails lower prices.

Thirdly, we conjecture that *market size*, proxied here simply by the country's population, will be inversely related to price because of (a) the specialization that a large domestic market permits[27] and (b) simple economies of scale. Moreover, because trade (or import) share of GDP is known to be inversely related to population size – small countries, all else equal, trade more – inserting this control for 'natural' openness makes our imports/GDP variable a better test of the effects of 'policy' openness.

Fourthly, as changes in demand can affect both components of real prices (nominal prices and the exchange rate), we control for business cycles by including *GDP growth*. Our prior assumptions here are less obvious because, by also controlling for the exchange rate (see below), we are effectively simulating a 'gold standard' of irrevocably fixed exchange rates. Just as economic expansion lowered price levels during the nineteenth-century gold standard, so should it here: imagine, for example, that a country doubles cheese production but that the money supply and exchange rate remain fixed; while a dollar used to buy two units of cheese, it is now equivalent to four. Thus economic growth, all else equal, lowers real prices.

[22] In practice, international price-level comparisons adjust national baskets to account for local tastes, e.g., substituting beer in the German 'basket' for wine in the French one. The International Comparisons Project has done this with considerable care and sophistication.

[23] Irving B. Kravis and Robert E. Lipsey, 'National Price Levels of Tradables and Nontradables', *American Economic Review*, 78 (1988), 474–8; Christopher Clague, 'Determinants of the National Price Level: Some Empirical Results', *Review of Economics and Statistics*, 86 (1986), 320–3; Jeffrey H. Bergstrand, 'Structural Determinants of Real Exchange Rates and National Price Levels: Some Empirical Evidence', *American Economic Review*, 81 (1991), 325–34.

[24] Bergstrand, 'Structural Determinants of Real Exchange Rates and National Price Levels'.

[25] Bela Belassa, 'The Purchasing Power Parity Doctrine: A Reappraisal', *Journal of Political Economy*, 72 (1964), 584–96; Paul Samuelson, 'Theoretical Notes on Trade Problems', *Review of Economics and Statistics*, 46 (1964), 145–54.

[26] Irving B. Kravis and Robert E. Lipsey, 'Toward an Explanation of National Price Levels', *Princeton Studies in International Finance* (Princeton: Princeton University Press, 1983); Jagdish Bhagwati, 'Why are Services Cheaper in Poor Counties?' *Economic Journal*, 94 (1984), 279–86.

[27] As Adam Smith (*Wealth of Nations*, I:3) first noted, 'The Division of Labour is Limited by the Extent of the Market'; hence in many specializations price will decrease as market size increases.

Finally, and crucially in any time-series analysis, we must control for (a) *exchange-rate fluctuations* and (b), because of indexation issues, the *US rate of inflation*. We discuss each separately.

(a) *Sharp changes in a country's exchange rate*: That domestic prices remain 'sticky' even under significant changes in a country's exchange rate is a commonplace of the literature, and indeed the whole reason that currency devaluations help to remedy imbalances on the current account; but this will have obvious and significant effects on the price level as defined by PPP/XR. We therefore employ year-to-year change in the given country's exchange rate – i.e., the percentage increase or decrease from the previous year's nominal exchange rate against the US dollar, $(XR_t - XR_{t-1})/XR_{t-1}$ as a control variable throughout our panel estimations.[28] Obviously, when XR rises but PPP is sticky, we expect real prices to decline; hence, the sign on this coefficient should be negative. In other words, we anticipate that a currency *depreciation* will be associated with *lower* real prices, while an *appreciation* will lead (at least in the short run) to higher real prices.

(b) If it is chiefly the United States that is undergoing an exchange-rate fluctuation, the problem is amplified, since conventional measures of real prices (on which we also rely) are anchored to US prices. Suppose the dollar is appreciating against all other currencies: then XR for all other countries will rise (a dollar will buy more units of the local currency), and real prices (PPP/XR) outside the United States will fall. Conversely, if the dollar falls against other currencies, real prices outside the United States should rise. What we need is a 'floating anchor' that takes into account internally-driven changes in the specific value of the US currency,[29] and we therefore insert *the US inflation rate* (GDP deflator) as a control variable. When the United States is undergoing high inflation, the dollar will depreciate against other currencies, leading every other country's XR to fall. The expected sign on the coefficient of US inflation should therefore be positive.

The description, data source and summary statistics of all of the variables are presented in Appendix 1.

THE PANEL DATA AND EMPIRICAL TESTING

The Data

We analyse annual price data (PPP/XR) for twenty-three OECD countries between 1970 and 2000.[30] The dependent variable, purchasing power parity over exchange rate (PPP/XP), has a mean of around 105.89, with a standard deviation of 24.58 and a range of 39.93 to 187.05. The price level for a given country in any year is indexed to US prices so that, for example, a figure of 106 signifies that overall prices are 1.06 times US levels.

[28] For present purposes, we thus take nominal exchange-rate variation as exogenous. In fact, of course, it is very much an object of government policy; and we take it as a topic for future research to consider whether particular political institutions are biased towards particular exchange-rate policies.

[29] An obvious alternative measure, the US deficit on current account, would often be driven by external factors, e.g. foreigners' willingness to invest in the United States.

[30] The set consists of all twenty-four states that were members of the OECD in 1990, except Turkey, for which data are inadequate. The countries included are thus Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, The Netherlands, Norway, New Zealand, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States. Note that the periods under dictatorship – in Greece (until 1974), Portugal (until 1975) and Spain (until 1977) – are excluded.

Empirical Analysis

We first establish whether our dependent variable is stationary. As is well known, when the dependent variable is not stationary, the underlying data-generating process does not remain constant over time; hence, the usual *t*-statistics will have non-standard distributions and will generate misleading inferences. We implement the Levin–Lin and Im–Pesaran–Shin test in our data, and find no evidence of non-stationarity.[31] Therefore, we proceed assuming stationarity of the dependent variable.

Model 1, incorporating all of the control variables discussed above into the model specification, tests the price-reducing effect of SMD systems. During our model-building process, we first are concerned with the possibility that the spherical errors assumption might not hold in our dataset. Belgium and Luxembourg, to take a minor but clear example, were in a full currency union throughout this period and hence are not independent observations on the exchange-rate variable. The results from the Breusch–Pagan LM test of independence and the modified Wald test for group-wise heteroscedasticity indicate strongly non-spherical errors. Accordingly, we estimate the model by using panel-corrected standard errors, as originally proposed by Beck and Katz,[32] to guard against potential problems of panel heteroscedasticity across countries and contemporaneous correlation of error. We also include the lagged dependent variable to account for first-order autocorrelation. Finally, to avoid the risk of omitted-variable bias – most notably from such unobserved country-specific characteristics as political culture, geography or institutional inheritance (such as a common-law system) but also from temporal shifts such as the oil shocks of the 1970s or technological change – we also incorporate country and time fixed-effects. Ideally, by including year dummies, we would be able to eliminate any bias caused by unaccounted trends and external shocks to which all these OECD countries might have been jointly exposed. However, two theoretical reasons impel us *not* to put much store in annual fixed-effects. First, our previous control variable, USAINF, provides a more coherent theoretical linkage between the common external shocks and the dependent variable than does a set of annual dummies. Secondly, the notion of annual fixed-effects is deceptive in the sense that the number of years in the model is theoretically unbounded as time goes to infinity.[33] Therefore, instead of using year dummy variables, we include *decade* dummy variables to capture the time dimension.[34]

The results in Model 1 (see Table 1) suggest strong negative price-level effects from SMD systems. According to this model, a short-run shift from PR systems to SMD systems leads to a reduction of price levels by 2.3 units (recall that the baseline is 100 in the United States). In the average OECD country, with a price level of 105.88, this amounts to a 2.1 per cent drop in prices. In the long run, the 'market basket' of goods and services under SMD systems is cheaper than under PR, in the average OECD country, by 14 per cent.[35] We note also, here and in the subsequent models, that the estimated coefficients on our control variables are consistently of the expected sign, albeit not in every case statistically significant.[36]

[31] The results are not reported here in the interest of space, but are available from the authors upon request.

[32] Nathaniel Beck and Jonathan Katz, 'What to Do (and Not to Do) with Time-Series-Cross-Section Data', *American Political Science Review*, 89 (1995), 634–47.

[33] Econometrically, Jerzy Neyman and Elizabeth L. Scott, 'Consistent Estimates Based on Partially Consistent Observations', *Econometrica*, 16 (1948), 1–32, show that one's estimates can be inconsistent if the model includes variables that increase in tandem with the number of observations (also known as 'the incidental parameter' problem).

[34] Our results are insensitive to the inclusion or the exclusion of fixed effects.

[35] (2.308/(1-0.844))/105.6 = 0.140.

[36] We observe that the coefficient of *USAINF* loses its significance once we include the decade fixed-effects – exactly as one might expect, since the variable *USAINF* is unit-invariant and highly correlated with the decade dummies. Parenthetically, we note also that the coefficients on the decadal dummies (using the 1970s as the baseline) are negative, suggesting the possibility that real prices relative to those in the United States were consistently dropping over this period. We also integrate country fixed-effects and decade fixed-effects in a unifying model, and our empirical results are again sustained.

TABLE 1 *Estimation Results*

Variables	Model 1 Fixed Effects	Model 2 Between Effects	Model 3 GMM	Model 4 Pool
Lagged Dependent Variable	0.84*** [0.03]		0.80*** [0.04]	0.90*** [0.02]
SMD	− 2.31*** [0.73]	− 14.72*** [4.41]	− 4.41** [2.10]	− 0.98* [0.51]
RESTRICT				1.07*** [0.25]
CLARITY				− 0.16 [0.29]
CGDP	0.0005*** [0.0001]	0.003*** [0.000]	0.0008*** [0.0002]	0.0001 [0.0001]
IMPORT	0.061 [0.06]	− 0.38*** [0.13]	0.15 [0.09]	− 0.08*** [0.02]
lnPOP	− 23.26*** [7.71]	− 2.03 [1.77]	− 21.86 [27.49]	− 0.90*** [0.16]
GROWTH	− 0.37*** [0.12]	− 0.23 [1.997]	− 0.32*** [0.09]	− 0.03 [0.09]
DXR	− 0.72*** [0.04]	0.02 [0.52]	− 0.72*** [0.11]	− 0.96*** [0.03]
USAINF	0.014 [0.19]	31.89** [13.27]	0.24* [0.14]	0.24* [0.12]
Constant		− 58.10 [79.82]	− 0.72*** [0.18]	25.85*** [3.39]
N	666	667	642	666

Note: All tests are two-tailed. The individual country coefficients (including the constant) in fixed-effects models are omitted in the interest of space. The dependent variable is real price levels (PPP/XR).
*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

One might reasonably argue that, in additions to the above fixed-effects estimates, the between-effects estimates might be desirable given the small number of changes in electoral systems over time. Model 2 reports the between-effects estimates and we can clearly see that SMD systems continue to show significant and strong negative price effects. Consistent with the results in Model 1, Model 2 estimates that the price level under SMD is lower than PR by around 14 per cent.

ROBUSTNESS CHECKS

To buttress our empirical analysis further, we now undertake a series of robustness checks. Particularly, we pay special attention to several substantive and methodological issues that are related to the construction of the dependent variable, the independent variables and the model specification.

First, one might suspect that our dynamic panel model, that introduces unobservable unit heterogeneity into the error term, might yield biased and inconsistent estimation due to the correlation between the lagged dependent variable and the composite error term. Indeed, the bias

remains of order 1/T even if we attempt to remove the unobserved heterogeneity by using the fixed-effect estimator.[37] Hence, we turn to the Arellano–Bond generalized method of moments estimator (GMM).[38] The results, presented in Model 3, continue to endorse a strong price-reducing effect of SMD systems even after we explicitly model the unobservable heterogeneity across countries. Next, to assure that our empirical results are not driven by any particular country, we perform a Jackknife analysis.[39] Specifically, we re-estimate the model repeatedly, excluding one country in each run. The coefficients of SMD in all sub-samples remain negative and significant throughout.[40]

Finally, we test our electoral systems hypothesis against other competing theories in the political economy literature. Indeed, even should we succeed in controlling for all possible confounders and, additionally, should we nevertheless continue to estimate a robust effect of electoral systems on real prices, we still will not have distinguished between several mechanisms by which electoral systems could yield lower price levels. Multiple governmental and electoral features co-vary with electoral system, any one of which could alone or in combination affect prices.

First, systematic differences between electoral systems in the provision of state funding for and spending caps on election campaigns could alter politicians' responsiveness to organized producers. As Denzau and Munger demonstrate in their model of how politicians optimize their allocation of effort between organized interest groups (read: producers) that provide electoral resources and unorganized interests (read: consumers) that provide only votes, resources attract legislators' favour.[41] Extending this model to nomination procedures under different electoral systems, Bawn and Thies find that legislators favour organized interests more under (closed list) PR than SMD.[42] Setting aside different marginal effects of producer resources such as campaign donations on legislative favour, differences in the amount of campaign donations legally permitted may also matter. Greater *governmental regulation and financing of campaigns* could theoretically reduce producer resources, weaken producers *vis-à-vis* consumers, and offset the marginal effect above. Hence, we utilize the Political Finance Database provided by the International IDEA.[43] Our special interest rests on two important indexes of governmental regulation and financing of campaigns – whether political parties receive direct public funding and whether there exists a ceiling on party election expenditure. In search of parsimony, we build a composite variable, *RESTRICT*, by taking the average of these two indices. We remain agnostic about whether the greater marginal effect or smaller sum of producer contributions in PR systems has the greater effect on legislative attentions. A large net effect in either direction, however, cannot be ignored.

[37] Badi Baltagi, *Econometric Analysis of Panel Data*, 2nd edn (New York: Wiley, 2001).

[38] Briefly summarized, the idea of this GMM estimator is to use first-differencing transformation to remove the unobservable unit effect. The resultant correlation between $\Delta y_{i,t-1}$ and $\Delta u_{i,t-1}$ from the transformation procedure is then instrumented out by using the dependent variable and all independent variables from two lags and before. For a detailed discussion of dynamic panel data in political science, see Gregory Wawro, 'Estimating Dynamic Panel Data Models in Political Science', *Political Analysis*, 10 (2002), 25–48; and also Manuel Arellano and Stephen Bond, 'Some Tests of Specificiation for Panel Data: Monte Carlo Evidence and an Application to Employment Equations', *Review of Economic Studies*, 58 (1991), 277–97.

[39] Bradley Elton and Robert Tibshirani, *An Introduction to the Bootstrap* (Boca Raton, Fa: Chapman and Hall/CRC, 1993); J. Gentle, *Elements of Computational Statistics* (New York: Springer-Verlag, 2002).

[40] See Appendix 2 for detailed results.

[41] Arthur T. Denzau and Michael C. Munger, 'Legislators and Interest Groups: How Unorganized Interests Get Represented', *American Political Science Review*, 80 (1986), 89–106.

[42] Kathleen Bawn and Michael F. Thies, 'A Comparative Theory of Electoral Incentives: Representing the Unorganized under PR, Plurality, and Mixed-Member Electoral Systems', *Journal of Theoretical Politics*, 15 (2003), 5–32.

[43] www.idea.int/parties/finance/db/ Note that Greece and Luxembourg are not covered in this database and hence are dropped from our analysis.

Powell and Whitten offer a second alternative mechanism, certainly strongly associated with electoral system.[44] To explain the instability of the economic vote estimated in cross-national election studies, they argue that institutional arrangements clarify or obscure the responsibility of governing parties for policy outcomes.[45] Voters hold high-clarity governments accountable for policy outcomes but cannot assign blame or credit as easily when multiple parties have hands on the wheel. We note that many of the components that increase *clarity of responsibility*, including those introduced by subsequent research,[46] are associated with majoritarian electoral arrangements: majority governments, single-party governments, absence of proportional committee systems, a low number of parties in government, ideological cohesion of governing parties. Single-party governments, which commonly emerge in SMD systems, understand that voters will punish or reward them – not a coalition member – for changes in the purchasing power of their income. Accountability, in turn, may tilt legislators' favours from producers to consumers. Entertaining this rivalry mechanism that might be driving a spurious relationship between electoral systems and price levels, we construct a dummy variable, *Clarity*, which takes the value of 1 under countries with high levels of clarity of responsibility.[47]

Model 4 provides a level playing field for these three competing hypotheses. As we can see, the positive and significant coefficient of *RESTRICT*, contrary to expectations, suggests that countries with stricter regulation of campaign finance are also associated with *higher* price levels. It is possible that campaign finance regulations and prices might both be determined by an omitted variable but whatever this might be, it is not the electoral system. As of the year 2000, thirteen out of fourteen PR and six out of seven SMD states offered direct state funding of political campaigns. Campaign spending caps vary more across electoral systems – three out of fourteen PR and four out of seven SMD states imposed them in 2000 – but the stability of the SMD coefficient in Model 4 suggests that campaign finance regulations have little systematic association with the electoral system. While the regulation of campaign spending has a significant and positive effect that contradicts the expectations of the campaign finance rival hypothesis, *CLARITY* simply reveals no significant effect. Clarity of responsibility seems not to impose any consequence on prices. Despite controls for rival mechanisms, the electoral system remains a crucial institutional force that suppresses price levels.

In sum, all the analyses presented so far, including checks for robustness against most (but, obviously, not all) conceivable sources of estimation error, underscore our basic result: real prices are indeed lower under SMD systems. Controlling for wealth, trade barriers, population size, GDP growth rate, exchange rate fluctuations and the inflation rate in the United States, SMD electoral systems are associated with at least a 10 per cent drop in real prices in the average OECD country.

DISCUSSION AND CONCLUSION

The model laid out in Rogowski and Kayser[48] strongly suggests that governmental policy will be biased towards consumers under almost all majoritarian electoral systems, towards producers – or, more generally, towards organized interests – under systems of PR; and one clear manifestation of this bias will be higher price levels under PR, lower prices under majoritarian systems. The empirical analysis of that article, however, relying as it did solely on a cross-section of the OECD countries

[44] G. Bingham Powell and Guy Whitten, 'A Cross-National Analysis of Economic Voting: Taking Account of the Political Context', *American Journal of Political Science*, 73 (1993), 391–414.

[45] Martin Paldam, 'How Robust is the Vote Function? A Study of Seventeen Nations over Four Decades', in Helmut Norpoth, Michael Lewis-Beck and Jean Dominque Lafay, eds, *Economics and Politics: The Calculus of Support* (Ann Arbor: University of Michigan Press, 1991), pp. 9–32.

[46] Guy D. Whitten and Harvey D. Palmer, 'Cross-National Analyses of Economic Voting', *Electoral Studies*, 18 (1999), 49–67; Richard Nadeau, Richard G. Niemi and Antoine Yoshinaka, 'A Cross-National Analysis of Economic Voting: Taking Account of the Political Context across Time and Nations', *Electoral Studies*, 21 (2002), 403–23.

[47] Luxembourg, Portugal, Spain and Iceland are not covered in Powell and Whitten's study.

[48] Rogowski and Kayser, 'Majoritarian Electoral Systems and Consumer Power'.

for a single year, could only establish the plausibility of the hypothesis. Evidence for the OECD countries over a period of thirty years now bears out the theoretical expectation, both cross-sectionally and over time, with considerable robustness and under a much greater variety of statistical tests: SMD electoral systems are associated with lower prices; and hence, we conclude, also with greater consumer power. Moreover, we are able to establish, as the earlier study did not: (a) the likely effects of a change of electoral system in a single county and (b) the short-term vs. long-term impact and the length of time required to reach the new equilibrium. We attach particular importance to the present finding that the long-term effects of electoral systems are at least as strong as the cross-sectional ones that the earlier study established. Finally, the present study, by exploiting the fortuitous fact that several OECD countries changed electoral systems in the 1980s and 1990s, substantially remedies problems of systematic differences between PR and SMD systems.

Throughout this Note we have emphasized that governments favour producers or consumers through the regulation of competition. It is instructive at this point to observe that, in the real world, governments manifestly do inhibit competition, and keep prices high, through an astonishingly inventive variety of measures; and that practising politicians and policy advocates frequently note, or even more frequently simply take for granted, that PR regimes favour the enactment and survival of such measures.

In relatively open economies,[49] competition-inhibiting measures naturally concentrate on *non-traded* goods and services, and on the non-traded component of otherwise tradable goods (for example, the retail price of apparel): construction, retailing of all sorts, baking, barbering, banking, printing, insurance, teaching, the legal profession, hotel-keeping, and medical and pharmaceutical services (to name only a few) may easily be restricted as to (*inter alia*) licensing, hours and size of operation, discounting, advertising and compulsory guild, union or associational membership.[50] Overall, such a system will (as intended) keep prices high, and indeed will impose further costs not fully captured by prices: the opportunity costs of extra search and shopping, the dynamic costs of weak innovation, the incentives to prefer leisure over labour.

Against its obvious disadvantages must be set the (equally, or to some, more) obvious *advantages* of such a system: higher wages, less inequality, greater security of employment, greater leisure, greater variety (particularly of services), more expert service, higher-quality goods, even perhaps a 'de-commodification' of work.[51] The normative assessment of which basket of outcomes is superior must ultimately be left to the preferences of the reader.

Before concluding, we also note that several positive questions remain unresolved, not least about endogenous institutions and the role of electoral competitiveness. Consider endogenous institutions: while this Note treats the electoral system as exogenous, one might reasonably suspect that policy outcomes induced by alternative electoral systems in turn shape voters' preferences about the choice of electoral systems. Put differently, while this Note shows that PR (majoritarian) systems systematically lead to higher (lower) prices and higher socio-economic equality (inequality), it might well be the case that voters in societies characterized by greater equality (inequality) are motivated to support PR (majoritarian) systems. In this sense, electoral systems could be self-sustaining, and the self-reinforcing cycle between the choice of electoral system and social equality may provide a previously unnoticed account for institutional stability.

No less important a topic for future research is the role of electoral competitiveness. Careful readers of the original Rogowski and Kayser model will recall that the seats–votes elasticities are predicated on an equal division of the vote. Once a single party in a majoritarian system becomes sufficiently dominant, the price predictions of the model actually reverse. That is, majoritarian

[49] We find below that openness itself – measured as the import share in GDP, and controlling for population size – powerfully restrains prices.

[50] See Lewis, *The Power of Productivity*; Marcus Walker, 'Behind slow growth in Europe: Citizens' tight grip on wallets', *Wall Street Journal*, 10 (December 2004), p. 1.

[51] Gøsta Esping-Andersen, *The Three Worlds of Welfare Capitalism* (Princeton, N.J.: Princeton University Press, 1990).

countries with dominant parties – for example India under the Congress party – can expect higher prices than they would have had under PR. Investigating the precise role of electoral competitiveness in mediating or moderating the relationship between electoral systems and real price levels promises considerable gains.

These and other questions call for investigation. But we take it by now as at least highly likely that, among the economically advanced democracies, more majoritarian systems produce policies markedly friendlier to consumers, and less favourable to producers, than do systems of proportional representation.

APPENDIX 1 *Description, Source, and Summary Statistics for All Variables*

Variables	Description	Source
PPP/XR	Purchasing power parity over exchange rate.	International Comparison Programme, *Penn World Tables*
SMD	Dummy variable for countries that employed a single member district system in the given year: 1 = SMD, 0 = any other system	Lijphart,* Cox†
CGDP	Gross domestic product (GDP) per capita in US dollars	World Economic Outlook Database, April 2002
IMPORTS	Imports of goods and services as a percentage of GDP	World Economic Outlook Database, April 2002
LNPOP	Natural log of population.	2002 World Development Indicator, CD-Rom
GROWTH	Annual GDP growth (%)	2002 World Development Indicator, CD-Rom.
DXR	Local currency appreciation relative to the US dollar: see text	2002 World Development Indicator, CD-Rom.
USAINF	The US inflation rate	World Economic Outlook Database, April 2002

Variables	*N*	Mean	s.d.	Min	Max
PPP/XP	692	105.88	24.58	39.93	187.05
SMD	694	0.27	0.44	0	1
CGDP	694	14,508.39	9,508.65	1,505.00	45,505.70
IMPORT	694	30.43	20.68	5.24	123.65
lnPOP	694	16.26	1.64	12.22	19.45
GROWTH	691	2.92	2.45	− 7.28	13.06
DXR	671	2.43	12.27	− 29.35	101.13
USAINF	694	5.11	3.00	1.5	13.5

*Arend Lijphart, *Patterns of Democracy: Government Forms and Performance in Thirty-Six Countries*, (New Haven, Conn.: Yale University Press, 1999).
†G. Cox, *Making Votes Count: Strategic Coordination in the World's Electoral Systems* (New York: Cambridge University Press, 1997).

APPENDIX 2 *Jackknife Analysis*

	Maximum coefficient	Country omitted at max. coeff.	All countries (Model 3)	Minimum coefficient	Country omitted at min. coeff.
PPP/XR_{t-1}	0.87*** [0.024]	Portugal	0.86*** [0.022]	0.85*** [0.019]	Iceland
SMD	− 2.28*** [0.52]	Britain	− 1.73*** [0.49]	− 0.88* [0.58]	New Zealand
CGDP	0.0004*** [0.0001]	Luxembourg	0.0003*** [0.0001]	0.0002*** [0.0000]	Iceland
IMPORT	− 0.14*** [0.0198]	New Zealand	− 0.13*** [0.0173]	− 0.08*** [0.010]	Iceland
lnPOP	− 2.21*** [0.38]	New Zealand	− 1.84*** [0.31]	− 0.84*** [0.13]	Iceland
GROWTH	− 0.27*** [0.08]	Iceland	− 0.09 [0.13]	− 0.05 [0.13]	Japan
DXR	− 0.83*** [0.029]	Iceland	− 0.67*** [0.042]	− 0.66*** [0.041]	Japan
USAINF	0.11 [0.14]	Iceland	− 0.026 [0.19]	− 0.061 [0.19]	Italy

Note: The maximum and the minimum are defined in terms of absolute value. Panel-corrected standard errors in bracket.
*If $p < 0.1$, **If $p < 0.05$, ***If $p < 0.01$. All tests are two-tailed.