MAJORITARIAN ELECTORAL SYSTEMS AND CONSUMER POWER: PRICE-LEVEL EVIDENCE FROM THE OECD COUNTRIES

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ABSTRACT:

A straightforward extension of the standard Stigler-Peltzman model of regulation, coupled with the Taagepera-Shugart analysis of electoral-system effects, suggests: (a) that the greater seat-vote elasticities of majoritarian electoral systems will tilt policy in favor of consumers, while proportional systems should strengthen producers; and (b) that the pro-consumer bias of majoritarian systems should be manifested in systematically lower prices. Empirical tests, controlling for the structural determinants of national price levels established in the earlier "law of one price" literature, establish majoritarian electoral systems as a significant and robust predictor, lowering national price levels in the mean OECD country by between ten and seventeen percent.

Students of political economy have investigated the political and economic effects of electoral systems for well over a century, and research in recent decades has established a broad array of significant regularities.[1] This paper suggests a previously unnoticed and (we believe) equally important effect, namely that systems of proportional representation (PR) systematically advantage producers and disadvantage consumers. We pursue twin insights from the pioneering work on regulation of Stigler (1971) and Peltzman (1976): (a) that what matters most for policy is politicians' *marginal rate of substitution* between producers' and consumers' support; and (b) that *prices* – or, more precisely, departures from competitive prices – reliably indicate that trade-off. We first develop and analyze a simple model of political support that faithfully incorporates the Stigler-Peltzman story. Along with more predictable comparative statics, this model leads to the implication that PR systems (a) consistently tilt policy toward producer interests and (b) entail, as one aspect of that bias, higher prices. We then test that implication against price data – gleaned largely from the extensive literature on the "Law of One Price" (LOP) – for the OECD countries. The clear finding is that – controlling for virtually every other possible influence – prices of goods and services are systematically higher in PR countries.

The Stigler-Peltzman Framework

The essential insight of the Stigler-Peltzman (S-P) analysis of regulation can be conveyed by a single, widely familiar, diagram (Figure One). Suppose that the price of a given industry's

[1] Among the earliest works were Mill 1861 and Bagehot 1867. We now know with reasonable certainty that proportional (as opposed to majoritarian) methods of election are associated with: (a) higher voter turnout (e.g. Beyme 1985), (b) less strategic voting (Cox 1997, esp. p. 100); (c) less political violence (Powell 1982, chaps. 4 and 8), (d) greater cabinet instability and shorter-lived governments (Powell 1982, esp. chap. 7; Lijphart 1984, chap. 5), (e) higher governmental expenditures (Persson and Tabellini 2000b) and budgetary deficits (Roubini and Sachs 1989; Grilli, Masciandaro, and Tabellini 1991; but cf. Sakamoto 2001), (f) more welfare spending (whether as a share of total spending or of GDP: Persson and Tabellini 2000b); (g) greater openness to trade (Rogowski 1987); and (h) greater equality of incomes (Birchfield and Crepaz 1998; cf. Austen-Smith 2000).

product is represented on the horizontal axis, its profits on the vertical one. Then at the perfectly competitive price p_c, profits will be zero. To the extent that regulation in any of its familiar forms – licensure schemes that artificially restrict supply, regulatory boards that set minimum prices, impediments to efficient retailing, tariffs, quotas, etc. – can raise price above this competitive level, total industry profits begin to rise,[2] until price reaches the level that a monopoly would impose (when, of course, marginal cost just equals marginal revenue and industry profit is maximized); this is denoted as p_m. If regulation becomes so restrictive of supply as to push price even beyond this monopolistic level, industry profits again decline, returning eventually to zero when the price becomes literally prohibitive.

[FIGURE ONE ABOUT HERE]

Producers in the sector of course pursue p_m; consumers, p_c. Politicians, in the S-P framework, simply want to maximize support. They therefore consider the marginal rate of substitution between producer and consumer support, represented by a set of iso-support curves I_s. We depict in Figure One only the relevant member of this family, namely the highest one tangent to the price-profit "hump." The S-P prediction is, of course, that government will bring price (and hence profits) to precisely the level indicated by the point of tangency, denoted here as p_r, the "regulated" price.

Now consider the iso-support curves (and the prices they yield) more closely. If producers are quite powerful relative to consumers in a given sector, the I_s curves will be nearly flat: for a politician to gain enough consumer support to compensate for even a slight decrease in

[2] Absent barriers to entry, these profits of course will be competed away; but the same political power that imposes higher prices is usually effective (and inventive) enough to devise barriers to entry.

industry profits, the price would have to decrease by some quite large amount. Conversely, if consumers greatly outweigh producers in a given sector, the I_s curves will be almost vertical: to compensate for the ire that even a slight price increase would arouse among consumers, profits would have to rise hugely. In the former case, logically enough, regulators impose almost exactly the monopoly price p_m; in the latter, they depart very little from the competitive price p_c. In this precise sense, price – or, more exactly, departure from competitive price – indicates almost perfectly the balance of consumer-producer political power in the given industry.[3]

Modeling the Stigler-Peltzman Support Function

As presented, the S-P isosupport curves are little more than descriptions: a "steeper" curve simply says that politicians attend more to consumers, a "flatter" one, that producers' views matter more. To move beyond description, we develop a simple model of political support, formalizing the Stigler-Peltzman analysis, and examine its comparative statics.

Suppose that the incumbent government, and the opposition, care about two things: (a) *legislative*, or parliamentary, support and (b) campaign funds, or more generally *money*.[4] Let L denote the former, M the latter; then, consistent with Stigler-Peltzman, we stylize political support S as a Cobb-Douglass function[5] of the form

$$S = M^{\alpha} L^{1-\alpha} \mid \alpha \in (0, 1) \qquad (1).$$

[3] Two exceptions, neither of them (we believe) significant in the long run, occur to us. First, government may be pressured by a powerful industry simply to apply a subsidy and let price seek its own level (e.g., the "Brannan Plan" of unsavory memory in U.S. agriculture). Second, government may impose "sin taxes," e.g. on tobacco and alcohol, whose professed intent is to suppress consumption, thus moving (possibly) even above p_m.

[4] Alternatively, one could think of support purely in legislative terms, taking legislative support as a function of votes and money (i.e., S=L(V,M)). So long as one acknowledged that the seats-votes elasticity was systematically higher in majoritarian electoral systems, the result reported here would continue to obtain – and, indeed, could be demonstrated almost trivially. The form adopted here accepts that money can play an important role between, as well as during, elections, and therefore seems to us to conform better to experience.

Legislative support – the share of seats in parliament that the government can command – is taken as a function of vote share V, i.e. $L = L(V)$, $\partial L/\partial V > 0$.[6] For simplicity we regard producers and consumers as mutually exclusive groups and assume – realistically, we believe – that consumers can contribute only votes, while producers can offer both votes and money.[7] We take it that consumers' support (in votes) will be decreasing in p (the price level), while producers' support (in both money and votes) will be increasing in π, the level of profits.

Slightly more formally, we have

$$M = M(\pi),\ \partial M/\partial \pi > 0 \qquad (2)$$

and

$$V = V_p(\pi) + V_c(p),\ \partial V_p/\partial \pi > 0,\ \partial V_c/\partial p < 0 \qquad (3),$$

where V_p denotes vote share from producers, V_c vote share from consumers.

With appropriate substitution from (2), (3), and the formula for P, we can re-write (1) wholly in terms of π and p as

$$S = (M(\pi))^{\alpha}[L(V_p(\pi) + V_c(p))]^{1-\alpha} \qquad (4);$$

and from here we can determine the MRS, $d\pi/dp$, according to the conventional formula (or via the Implicit Function Theorem)

$$d\pi / dp = -\frac{\partial S / \partial p}{\partial S / \partial \pi} \qquad (5).$$

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[5] Only c.e.s. (constant elasticity of substitution) functions generate the nicely tractable convex isosupport curves that the Stigler-Peltzman approach assumes; of c.e.s functions, the Cobb-Douglass is the standard and simple "workhorse;" hence we employ it here.
[6] In reality, electoral systems frequently violate even weak monotonicity, i.e. winning more votes may actually yield fewer parliamentary seats; the assumption of strong monotonicity is invoked here only to simplify modeling.
[7] Note that this assumption "stacks the deck" against our claim that electoral system matters for the shape of isosupport curves. If, by analogy to Denzau and Munger (1986, esp. 93), we assumed that consumers could contribute only votes, producers only money, the greater steepness of majoritarian isosupport curves would follow almost self-evidently.

Note first that $\partial S/\partial p$ =

$$(M(\pi))^{\alpha}(1-\alpha)\, L^{-\alpha}\, (\partial L/\partial V)\, (\partial V_c/\partial p) \qquad (6),$$ [8]

while $\partial S/\partial \pi$ =

$$\alpha\, (M(\pi))^{\alpha-1}\, (\partial M/\partial \pi)\, L^{1-\alpha} + (M(\pi))^{\alpha}(1-\alpha)\, L^{-\alpha}\, (\partial L/\partial V)\, (\partial V_p/\partial \pi) \qquad (7).$$

The MRS can then be stated as $\partial \pi/\partial p$ =

$$-\frac{\partial V_c/\partial p}{\frac{\alpha}{1-\alpha}\frac{\frac{\partial M/\partial \pi}{M(\pi)}}{\frac{\partial L/\partial V}{L(V)}} + \frac{\partial V_p}{\partial \pi}} \qquad (8).$$

Since by assumption $\partial V_c/\partial p < 0$, while all other terms in (8) are positive, the MRS is *positive* (thus producing the upward-sloping Stigler-Peltzman isosupport curves).

The comparative statics revealed by (8) accord for the most part with intuition. The isosupport curves become *steeper* (signifying greater consumer power and, all else equal, lower prices) as:[9]

- consumer votes become more responsive to prices ($\partial V_c/\partial p$ grows more negative);
- politicians weight votes (as opposed to money) more heavily (decreasing α, hence increasing $1-\alpha$); or
- politicians already have more monetary support (higher M).

Conversely, the curves become *flatter* (implying greater producer power and higher prices) when:

- producers' votes or monetary contributions become more responsive to profits (rising $\partial M/\partial \pi$ or $\partial V_p/\partial \pi$)

[8] Note that, by (3), $\partial V/\partial V_c = \partial V/\partial V_p = 1$; hence we can ignore both terms in applying the chain rule of differentiation.
[9] Bear in mind that whatever decreases the denominator in (8) increases the MRS, i.e. implies steeper curves; whatever increases the denominator decreases the MRS, implying flatter isosupport curves.

- politicians weight money more heavily (larger α) or
- the government already enjoys higher levels of parliamentary support (L).[10]

Our most important result is not at all intuitively obvious but clear from (8): all else equal, the isosupport curves become *steeper*, therefore more consumer-friendly, as

- seats-votes elasticity ($\partial L/\partial V$) increases.[11]

I.e., the greater the percentage increase in seats produced by a one percent increase in votes, the more policy will favor consumers and – assuming that the original Stigler-Peltzman analysis is correct – the more closely prices will approximate the competitive level. We therefore focus the next stage of our analysis on the seats-votes elasticity as a property of the electoral system.

To foreshadow our results there, under normally competitive circumstances majoritarian systems exhibit a seats-votes elasticity considerably higher – to be precise, two-and-one-half to eight times higher – than proportional systems. It thus will follow directly that, if our model has accurately captured this aspect of reality, majoritarian systems – or those, at any rate, in which two parties compete effectively and roughly divide the vote – will be systematically more pro-consumer in their policies and will have significantly lower prices.

To the best of our knowledge, this hypothesized link between seats-votes elasticity and pro-consumer policies has previously gone unobserved, yet it emerges clearly from our model, from the Stigler-Peltzman approach more generally, and (we shall assert) from a preliminary inspection of the evidence. The intuition behind it will seem paradoxical to most students of politics: if one group can influence policy by both money and votes, another only by votes, then

[10] Thus, all else equal, countries with entrenched dominant parties – Japan under the LDP, Mexico under the PRI, India under the Congress Party -- will disadvantage consumers. We show below (p. 10ff.) that this is particularly the case in majoritarian systems, and that indeed under extreme single-party dominance (what some used to call "one and one-half party systems"), PR advantages consumers more.
[11] As $\partial L/\partial V$ increases, holding all other terms constant, the overall denominator in (8) *decreases*; hence the MRS *increases*, implying a steeper isosupport curve.

whatever increases the impact of votes shifts policy toward the group that has *only* votes.[12] At a purely mechanical level this is clear enough as one considers (5), (6), and (7) in tandem: any increase in $\partial L/\partial V$ multiplies (6), the numerator of (5), by its full amount; yet the same increase is diluted in (7), the denominator of (5), by the unchanged term in the first part of that expression, which represents the marginal effect of money.

At a deeper level, this effect – that advantaging a given factor benefits disproportionately those who command *only* that factor – generalizes and seems less paradoxical. If one group in a society can offer only unskilled labor, another some mix of human capital and labor, we find nothing remarkable in the conclusion that an exogenous increase in the marginal productivity of unskilled labor will leave the unskilled better off.

The effect outlined here is essentially the same, yet in the political context it raises a variety of interesting and troubling implications, to which we shall return in our concluding discussion.

The Seats-Votes Elasticity: Why the Electoral System Matters

Every electoral system may conveniently be regarded as a method for translating parties', or candidates', shares of the popular vote into shares of offices, typically of seats in parliament. Notationally, where V_i represents the ith party's ($i \in [1,N]$) share of popular vote, L_i its share of parliamentary seats (and of course subject to the constraint $\Sigma V_i = \Sigma L_i = 1$), we characterize an electoral "rule" simply as a function r

$$L_i = r(V_i). \qquad (9).$$

[12] To forestall one possible misinterpetation of these results: it is *not* the case that producers would be better off if they gave no money: indeed, it is always the case that the more sharply monetary contributions respond to increased profits, i.e. the higher is $\partial M/\partial \pi$, the more pro-producer policy will be (i.e., the flatter the iso-support curves).

An important insight of recent work on electoral systems has been the observation by Taagepera and Shugart (1989) that virtually every extant electoral "rule" can be approximated[13] by a power function of the form

$$L_i = \frac{V_i^\tau}{\sum_1^N V_i^\tau} \qquad (10),$$

where V_i is the ith party's vote share and L_i is the same party's share of parliamentary seats. In systems of proportional representation, τ approximates one by design. According to an observation current even in the early twentieth century,[14] in plurality single-member district (SMD) systems, as used e.g. for elections to the British House of Commons or the U.S. House of Representatives, something like a "cube rule" prevails, i.e. $\tau \cong 3$. If, for example, four parties competed and won, respectively, 10, 20, 30, and 40 per cent of the vote, a typical SMD system might award them (in the same order) 1, 8, 27, and 64 per cent of the seats. In fact, as Taagepera and Shugart show, the typical SMD system exhibits a value of τ closer to 2.5; while the U.S. Electoral College, because of its "winner-take-all" (bloc vote) provision in almost all states, has a historic value of approximately $\tau = 8$.

Economists and political scientists have long been interested in this class of functions in other contexts. Hirshleifer (1991), for example, following earlier work by Tullock, posits a "contest success function" of exactly this form, which relates "fighting effort" to probability of winning; and he aptly designates the counterpart of the τ parameter as a "decisiveness" factor (Hirshleifer 1991, 181). Even earlier, Theil (1969), from a purely normative standpoint and

[13] The fit of actual data to the predicted curve is never perfect, but the essential insight – that more majoritarian systems are characterized by significantly higher seats-votes elasticities in the competitive range – is extremely robust.

seemingly in ignorance of any empirical referent, suggested that seats *should* be allocated to parties by such a formula, and that the median voter's preference over the desirable value of τ should be decisive.

A particularly revealing property of (10) is that, for the two-party case when each party captures half the vote ($V_i = .5$), τ expresses exactly the seats-votes elasticity, i.e. the percentage increase in seats to be anticipated from a one percent increase in votes.[15] To put the matter concisely: in the two-party case under PR, moving from 50 to 51 per cent of the popular vote raises a party's seat share by precisely the same margin; under SMD, the same increase moves it (give or take) to 52.5 per cent of the seats; and in the U.S. Electoral College, such a shift in popular vote yields around 58 per cent of the Electors. The relationship between vote share (horizontal axis) and seat share (vertical axis) is plotted in Figure Two for the three representative cases: PR ($\tau = 1$), SMD ($\tau = 2.5$), and the Electoral College ($\tau = 8$).

[FIGURE TWO ABOUT HERE]

The two-party scenario, with each capturing about half the vote, is highly relevant to non-PR systems because (a) the higher the τ, the greater the disincentives to third-party formation (a

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[14] See historical discussion in Kendall and Stuart 1950.

[15] In the two-party case, $L_i = \dfrac{V_i^\tau}{V_i^\tau + (1-V_i)^\tau} = \dfrac{1}{1+(\frac{1}{V_i}-1)^\tau}$

hence we have also $\dfrac{dL_i}{dV_i} = \dfrac{\tau(\frac{1}{V_i}-1)^{\tau-1}}{(1+(\frac{1}{V_i}-1)^\tau)^2 V_i^2}$

which self-evidently, for $V_i = 1/2$, reduces to τ.

point known to students of politics as Duverger's Law); and (b), under two-party competition on a single dominant issue-dimension (Downs 1957), the dominant strategy for both parties is to converge on the position of the median voter and thus to win exactly half the electorate (cf. Persson and Tabellini 2000a, chap. 3). Since in PR systems the seats-votes elasticity is everywhere $\tau = 1$, and since in non-PR systems under normally competitive circumstances (with each of two major parties capturing roughly half the vote) it will closely approximate τ, we can normally take τ in either system as equivalent to the seats-votes elasticity, $\partial L/\partial V$.

The rare cases of majoritarian systems with a highly dominant party – the U.S. under the New Deal, India under the long Congress Party hegemony – provide the exception that tests the rule. Within the class of majoritarian systems, policy should tilt sharply toward producers as politics become less competitive. Moreover, as a rough rule of thumb, whenever a single party captures three-fifths or more of the vote in U.S. Presidential contests, or more than about two-thirds in an SMD system, a shift to PR will benefit consumers.[16]

For the general case, however, and returning to the model outlined earlier, we can re-write (8) as

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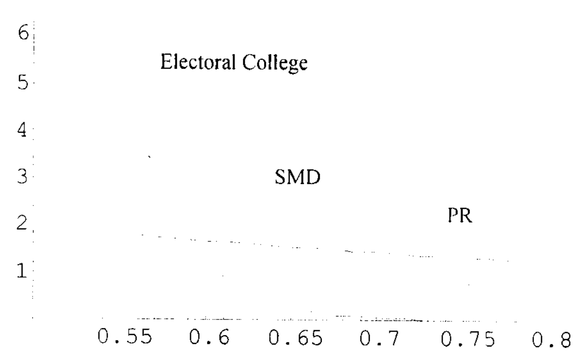
[16]If one plots $(\partial L/\partial V)/L(V)$ under the earlier specification (above, fn. 15) as a function of V under PR (τ=1), SMD (τ=2.5), and the Electoral College (τ=8), one gets the following result:



$$-\frac{\partial V_c / \partial p}{\frac{\alpha}{1-\alpha}\,\frac{\frac{\partial M/\partial \pi}{M(\pi)}}{\frac{\tau}{L(V)}} + \frac{\partial V_p}{\partial \pi}} \tag{8a}$$

and thus see the crucial theoretical prediction: normally, **the more majoritarian the system**, i.e. the higher its τ,

- **the steeper its Stigler-Peltzman iso-support curves**, and therefore
- **the more pro-consumer its policies** and
- **the lower its prices**, i.e. the more closely they approximate p_c, the level that perfect competition would produce.

The most readily observable implication of the model is that about price levels; and we propose to test precisely that hypothesis, namely that **price levels will be systematically lower in majoritarian countries**.

The (Attenuated) Law of One Price

The trick, of course, is to know what p_c might be in an already heavily regulated economy. An intuitively appealing method, frequently invoked in journalistic and policy discussions, is to take "world" prices as a benchmark: if, as is frequently alleged, U.S. domestic sugar prices are several times world levels, that observation suggests that powerful price-supporting mechanisms must be at work in the U.S. market – and, in the Stigler-Peltzman framework, that U.S. sugar producers wield far more political "clout" than do sugar consumers. Such an approach assumes, however, that the "Law of One Price" (LOP) obtains – i.e., that absent politically-imposed barriers to trade, any difference in the currency-corrected price of the

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Note that the "envelope" of highest lines is the most consumer-friendly position. For $V \leq .566$, this is the super-majoritarian Electoral College; for $V \in (.566,.684)$, it is SMD; for $V \geq .684$, it is PR. PR is more pro-consumer than an Electoral College whenever $V > .59$.

same item in different countries will quickly be arbitraged away. By this standard, any real price difference that persisted would have to be a result of political factors.

In reality, as a considerable literature shows, the LOP obtains only in highly attenuated form (see, *inter alia*, Kravis and Lipsey 1983, 1987, 1988; Bhagwati 1984; Clague 1986; Bergstrand 1991).[17] 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 GDP per capita. Simply put, richer countries, controlling for 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 (Kravis and Lipsey 1983, 1987, 1988; Clague 1986; but see Officer 1989 debate with Clague 1989). Extensive research on this striking relationship has failed to produce a satisfactory causal theory. The two most common conjectures stress, respectively, (a) differences in productivity between traded and nontraded sectors (Belassa 1964; Samuelson 1964) and (b) the effects of cross-national differences in capital/labor ratios (Kravis and Lipsey 1983; Bhagwati 1984). Yet even after controlling for the effects of these two factors, wealth correlates positively and significantly with prices (Bergstrand 1991). While we intentionally skirt the debate over whether different productivity best explains wealth's effect,[18] we accept the argument that wealth, *per se*, raises national price levels.[19]

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[17] In some analyses, cross-national price difference have been found to persist over hundreds of years: Froot and Rogoff 1995; Froot, Kim, and Rogoff 1995).

[18] The Belassa-Samuelson Theorem asserts that higher rich-country productivity in tradables raises national wage levels; those, in turn, are passed on to the consumer in the arbitrage-resistant nontradable sector. Poor countries' productivity in the nontradables sector may equal that in wealthy countries but lower wages reduce nontradable-sector prices and hence overall national price levels. The factor-endowments explanation posits that higher capital-to-labor ratios in rich countries boost the demand for, and the marginal productivity of, labor; that in turn lifts wages. Since the service sector in all countries is labor-intensive, nontradables - which comprise mostly services - should be sensitive to the price of labor. Higher relative labor abundance thus implies cheaper services in poor countries and lower national price levels.

A second factor making for persistent price-level differences is relative **factor endowments**: not only the capital/labor ratio already mentioned, but endowments (relative to other countries) of land, skill (human capital) and, more narrowly, energy. Capital abundance, as already noted, implies higher marginal product of labor, higher national wage levels, more expensive services, and hence higher national price levels.[20] Labor abundance, captured e.g. by an income distribution instrument (Clague 1986), should reduce the price of labor-intensive, non-tradable services and hence national price levels more generally. Land abundance – or, more precisely, abundance of agricultural resources (e.g., agricultural trade balance in Clague 1993) – may imply cheaper food via both large farm economies of scale and the avoidance of transaction costs on food imports. Abundant human capital – most commonly proxied by an education variable (e.g., Isenman 1980) – may reduce prices in skill-intensive specializations and in service sectors generally but may also – both by its direct effects on marginal productivity of labor and through its extreme complementarity with physical capital – imply high overall wage levels. And domestic energy abundance raises the prospect of "Dutch disease" in which high prices in the energy sector spill over into other areas.[21]

Third, there are the obvious **natural, cultural, and policy barriers** to arbitrage. Our general prior here is that less open economies – whether because of their distance from potential trading partners, their idiosyncratic or xenophobic tastes, or their governments' isolationist

[19] As Bergstrand (1991) and Falvey and Gemmell (1991) argue, given non-homothetic tastes, wealthier countries should have higher demand for nontraded services relative to traded commodities, raising their price. Wealthier consumers may also be less price sensitive, allowing for pricing-to-market (Krugman, 1987).
[20] This observation is hardly new. ". . . the prices of home commodities, and those of great bulk though of comparatively small value, are, independently of other causes, higher in those countries where manufactures flourish." Ricardo 1817, chap. 7.
[21] This type of cross-sectoral price shock is commonly associated with the unexpected discovery of gas reserves off the Dutch coast following the Second World War. A sudden rise in income in one sector stimulates demand for inputs shared by multiple sectors, from raw materials to housing for workers, thereby raising prices in all sectors (cf. Corden, 1984).

tendencies – will be better able to maintain prices above world levels. Our measure here is simply the deviation of imports/GDP from the level expected (from a gravity model) in the absence of trade barriers, and we anticipate that – again, all else equal – greater openness lowers prices.

Finally, we conjecture that **market size**, proxied here simply by the country's population, will be inversely related to price because of the specialization in sectors of comparative advantage that free-trade enables[22] and simple economies of scale.

Almost needless to say, when all of these variables – and a few more mundane controls explained below – are accounted for, part of the variance in cross-national price differences remains unexplained. We claim that, controlling for all of these variables, a country's electoral system has, as our model would predict, strong and robust effects on price levels: nations with majoritarian methods of election – in particular, with single-member parliamentary districts (SMD) – have lower prices, while ones with proportional and "mixed" methods of election have higher prices. The next section presents the evidence on this score.

Empirical Tests

The Law of One Price, when applied to overall national price levels rather than to a specific good, becomes the principle of Purchasing Power Parity (PPP). Just as the LOP predicts that arbitrage will equalize the prices of a given product in different locations at a given time, PPP predicts the same for *baskets* of identical goods.[23] This theory motivates our dependent variable. If identical baskets cost 100 U.S. dollars and 800 Swedish kronor, the purchasing

[22] 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.

power of the dollar is eight times that of the krona. Perfect arbitrage would require an exchange rate of eight kronor to the dollar; but suppose the actual exchange rate is 4:1. Then prices in Sweden are two times higher than in the United States, i.e. eight hundred kronor would buy twice as much in the U.S. as in Sweden.[24]

We test our hypothesis on prices of aggregate GDP and of national-level consumption in a sample of all twenty-four (as of 1990) OECD member countries.[25] Both dependent variables are commonly available in the Penn World Tables (PWT), Mark 5.6, which conveniently presents all PPP data in dollar equivalents cross-nationally indexed to a base value of 100 for the United States. Our independent variables, all measured in 1990, are defined as follows:

CGDP – gross domestic product (GDP) per capita in thousand US dollars, GDP/pop. Source: GDP is calculated as the IMF International Financial Statistics (IFS) GDP figures in local currency divided by IMF IFS exchange rate (rf..zf series); population is from PWT, 5.6.

Δ XR3 – percentage change in NC/USD exchange rate since 1987, i.e. local currency appreciation relative to the US dollar. Source: IMF IFS series rf..zf.

LnAraPop – natural log of 1990 per capita arable hectares of land, Ln((arable/pop)+1). Source: World Development Indicators CD-ROM (1999), ag.lnd.arbl.ha.pc.

LnDM – natural log of electoral district magnitude, the average number of seats per constituency in the lower house. Sources: Lane et al, 1991; Mackie and Rose 1991.

LnEnergy – natural log of domestic energy production/total final energy consumption, in Million metric tonnes of oil equivalent, Ln((production/consumption)+1). Source: Energy Balances of OECD Countries, 1989-90 and 1992-93, Country Tables.

LnPop – natural log of population in million inhabitants. Source: Penn World Tables, Mark 5.6.

Open – trade openness calculated as deviation from the level of import penetration

[23] In practice, international price level comparisons adjust national baskets to account for local tastes. The International Comparisons Project, producers of the Penn World Tables, whose price data we employ, has done just this.
[24] An interesting issue is whether electoral system effects get expressed chiefly via PPP or XR. Some scholars have conjectured that consumers prefer an overvalued exchange rate, producers an undervalued one; but this, in our terms, would mean that consumers prefer higher real prices. Cf. O'Mahony, 2001; Blomberg, Frieden, and Stein, 2001.
[25] Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, Norway, New Zealand, Portugal, Spain, Sweden, Switzerland, Turkey, UK, and USA.

(imports/gdp) expected in the absence of trade barriers. Specifically, Imports/GDP minus Freeop where Freeop = .7081-.0627Ln(Area)-.0795Ln(distance). Coefficients are first calculated from regression of Imp/GDP on LnArea, LnDist and LnTradetax in 63 country sample for 1990 following method originally developed by Jong Wha Lee (1993). Data source: World Development Indications CDROM.

SMD – dummy for countries that continuously employed a single member district electoral system for the ten years preceding 1990.

We now examine the effect of electoral systems on national price levels with a series of OLS regressions on cross-national data. The first and most parsimonious model (Table One, Column One) immediately reveals the predicted strong effect of wealth (*CGDP*) and a weaker but highly significant negative effect of single-member-district electoral formulae. Most remarkably, these two variables alone explain 90.3 percent of the variation in cross-national price levels and fit to the data extremely well (F=97.28, adj-R^2 = .89). As strong as these results are, theory and the possibility of specification error nevertheless demand we examine additional variables and test the robustness of Model 1.1.

One concern is the possibility that the SMD country dummy might capture effects other than that of electoral systems. We therefore substitute the log of district magnitude – the average number of members elected to the lower house of the legislature from a given district – for the SMD variable in Model 1.2.[26] Although *LnDM* is clearly weaker than *SMD*, the positive price effect of moving away from majoritarianism reassures us that *SMD* is largely capturing electoral system effects. The weaker effect also matches our priors that there is a discrete difference, due to direct constituency accountability and other features, separating single member districts from mixed systems and varying forms of proportionality. SMD is more than a single point along a district magnitude continuum. But even strictly within the seat-vote context, the weaker

[26] District magnitude in an SMD system is, by definition, one; hence the log of district magnitude in such systems is zero.

performance of *LnDM* is also unsurprising if one considers that, barring bloc vote arrangements, seat-vote elasticities decline precipitously once district magnitudes exceed one.[27]

Model 1.3 now returns to the SMD variable and adds two new regressors capturing trade openness, *Open,* and currency appreciation, $\Delta XR3$. Openness, defined as the deviation from the gravity model predicted level of imports/GDP absent trade barriers (Lee, 1993), offers a superior measure of trade barriers to the more common imports/GDP, a figure that does not account for the largest determinants of trade penetration such as market size and distance from trade partners. As expected, greater trade openness is strongly associated with lower national price levels.

Because price stickiness, the delayed adjustment of domestic prices in response to exchange rate fluctuations, could induce measurement error in cross-sectional data such as ours, we also include $\Delta XR3$, the net appreciation of each country's currency against the US dollar from 1987 to 1990. We expect a strengthening currency, simply as a matter of definition, to *raise* national price levels[28] and find our priors confirmed with exchange rate appreciation reaching significance at the one percent level.

Overall, the entire model performs even better than the first (SER drops; Adj-R^2 rises) and the inclusion of arbitrage and appreciation controls has little effect on majoritarianism's relationship to prices. This occurs despite the loss of four degrees of freedom, two to regressors and two to data problems. We omit Luxembourg from all specifications including $\Delta XR3$ as its fixed exchange agreement under the Belgium-Luxembourg *Union Economique* disqualifies it as

[27] Where dm represents district magnitude, the share of the district vote required to win a seat is approximated by 1/(dm+1). Hence reasonable proportionality -- or an approximation of a seats-votes elasticity of one -- is achieved quickly as dm exceeds one.

[28] Conventionally, a *depreciating* currency, via its inflationary effect on imported goods, is associated with higher price levels. Recall, however, that prices here are defined as PPP/XR, where XR (the exchange rate) is units of

an independent observation; Iceland similarly does not appear in regressions employing the trade openness variable due to missing data.

What about factor endowments? Model 1.4 again expands the specification to include measures of relative land to labor abundance (*LnAraPop*) and energy production to consumption (*LnEnergy*). Capital abundance and skill (human capital), although both strong bivariate predictors of price levels, are excluded due to high collinearity with per capita GDP. Neither of these two regressors has any noteworthy association with price levels, indicating little initial support for the agricultural economies of scale or the "Dutch disease" hypotheses, respectively. The other new variable, logged population, does display a markedly negative relationship to prices, however, indicating some, albeit weak, support for specialization and economy of scale effects. It also may be picking up the "home bias" or "border effects" documented by John McCallum (1995) and Engel and Rogers (1996), where a strong domestic bias in purchasing patterns undermines cross-border price arbitrage. Given this barrier to international trade, producers in small countries may face less domestic price competition than those in larger markets, thereby raising prices in smaller countries.

Controlling for factors and size, none of the previous model's (1.3) predictors are more than marginally influenced. Openness strengthens and the others – *CGDP, SMD, Open*, and *ΔXR3* – all weaken slightly. Despite the size of the model, we remain confident in the inference as little multicollinearity emerges to inflate standard errors (no VIF exceeds 2.48). Model 1.4 nevertheless produces the best fit to the GDP price data (adj-R^2 = .955). In this most fully specified model majoritarian electoral arrangements remain a highly significant ($p = .02$)

national currency per dollar. An appreciating currency means a *smaller* denominator; which, given any stickiness in PPP, must mean a *higher* price under this definition.

predictor, lowering the average country's GDP price level by an estimated 11.7 percent (115.92 to 102.31) from those expected under PR

[TABLE ONE ABOUT HERE]

We check the overall robustness of Table One's findings by repeating all four regressions on a related but distinct dependent variable, price levels of *national consumption.* Similar trends emerge, albeit with some interesting differences: *SMD* – our primary concern – displays an even stronger effect on consumption price levels; trade openness has a much weaker and only marginally significant negative effect on prices; currency appreciation drops to significance at only the five percent level; land abundance and population, both already weak, become fully insignificant; but energy emerges as a marginally significant predictor of consumption price levels, suggesting that "Dutch disease", if it exists at all, is a predominantly consumption oriented phenomenon. That said, the similarities are more noteworthy than the differences: comparing the best specified seven-variable models (1.4 and 1.8) shows that no variable changes sign and wealth remains by far the strongest price predictor. The coefficient for *SMD* actually increases: in the strongest specification, 1.8, majoritarian electoral systems are now associated with a 16.8 percent drop in predicted national price levels (110.59 to 92.01) for the average OECD country.[29]

[TABLE TWO ABOUT HERE]

Overall, *SMD* remains reassuringly robust throughout all four models in which it appears – two for each dependent variable – but the unexpectedly weak performance of several other regressors given our earlier priors motivates us to examine one more variant of the data. Following Clague (1993), we reason that the dominant practice of refunding taxes (most notably the value-added tax, or VAT) on exported goods and services but imposing them on imports distorts the prices predicted by trade and structural determinants; it is national price levels *net of tax* that we seek to explain. Accordingly, we deduct the respective share of national GDP and consumption price levels attributable to such taxes from the PWT price data used in Table One to create two new dependent variables, net of tax.[30]

The results of replicating Table One's regression on these net-of-tax price data are notable: the standard error of the regression in six of eight models falls even lower than in their Table One counterparts, producing remarkably high adj-R^2s. Only the poor performance of over-specified equations 2.4 and 2.8 defy this trend. Indeed the addition of *LnAraPop*, *LnPop* and *LnEnergy* – none of which even approach significance – actually worsens the performance of both models relative to their immediate predecessors, 2.3 and 2.7. Deducting the tax share from GDP and Consumption prices casts doubt on the efficacy of these measures as prices predictors.

Although, with the noted exceptions, the models fare better overall, all individual regressors with the exception of *CGDP* do not. The deterioration in performance of trade openness as predictor of is most apparent, falling to the ten percent level of significance for GDP prices and insignificance for consumption prices. Currency appreciation deteriorates less from a

[29] It is worth noting that one ambiguous case, France, experienced an interlude of PR between 1986 and 1988, interrupting the SMD system that had otherwise prevailed continually since 1958. We consequently disqualify France as an SMD state but note that all regression results are robust to the alternate coding.

stronger position: *ΔXR3* remains a strong predictor of GDP prices but is only marginally so for consumption ($p < .10$). Most important for this investigation, however, is the effect of SMD. Despite its weaker performance, *SMD* remains a robust predictor of national price levels, whether gauged by GDP or consumption, whether tax is included or excluded. Majoritarian electoral arrangements now lower predicted GDP and consumption (net-of-tax) price levels for the average country by 10.2 and 12.1 percent in the two best performing models, 2.3 and 2.7.

Implications and Discussion

In this paper we show, in a simple extension of the standard Stigler-Peltzman model of regulation, that the greater seat-vote elasticities of majoritarian electoral systems should bias policy in favor of consumers. Drawing on a second major insight of Stigler-Peltzman, namely that the relative balance of consumer-producer power is reflected in prices, we then hypothesize that, *ceteris paribus*, majoritarian systems will be associated with lower national price levels.

Empirical results of considerable robustness accord with these priors. Controlling for the relevant determinants of national price levels established in earlier economic literature, we find a dummy for majoritarian electoral systems to be a consistently negative and significant predictor of national price levels. These results have clear substantive meaning. For example, considering net-of-tax price levels, majoritarian electoral arrangements are associated with a twelve percent drop in the consumption price for the average OECD country. This is equivalent to the price effect of a $4070 drop per capita income, twenty-one percent of the mean OECD per person income. A more continuous proxy for proportionality of electoral system, namely logged electoral district magnitude, produces a uniformly positive (if not always statistically significant)

[30] We deduct the share of VAT from both the GDP and the Consumption figures using OECD Revenue Statistics VAT data.

coefficient and thus reassures us that the *SMD* dummy is indeed picking up economically salient differences in electoral systems.

Our results raise intriguing implications for other areas of research on comparative electoral systems. Most striking is the complementarity with empirical research on fiscal policy (see, *inter alia,* Persson and Tabellini, 2000b). Majoritarian systems have been found to generate lower levels of taxation, less government spending, and less redistribution than more proportional arrangements. Our mechanism, the greater marginal impact of votes, might also contribute to an explanation of these patterns in fiscal policy. Moreover, the claim raised in such specific cases of recent electoral reform as Italy and Japan (see, respectively, Katz 1996, esp. p. 37; Rosenbluth 1996; Ramseyer and Rosenbluth 1997), that a shift toward SMD will "strengthen the control of electors over the elected" (Katz) and help to deregulate the economy, may gain force from this perspective.[31]

Other factors may, of course, affect cross-national price differences; but we contend that any adequate account must include a crucial political variable: the given country's electoral system.

[31] David Laitin, in a private communication, has raised the intriguing conjecture that the electoral system will also strongly affect relations between political parties and interest groups. Because of the higher return to mobilization of voters in majoritarian systems, interest groups will likelier organize voters directly and threaten politicians with electoral retribution; by contrast, interest groups in PR systems will at the margin forgo electoral mobilization in favor of direct subsidization of parties. All else equal, the latter method is probably more open to corruption.

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Table One: Prices Including Tax

	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
	GDP Price				Consumption Price			
Constant	50.425***	40.804***	63.809***	89.467***	45.329***	36.011***	56.740***	72.957***
	(8.58)	(5.95)	(11.39)	(6.61)	(6.43)	(4.25)	(7.96)	(4.16)
CGDP	3.590***	3.582***	2.930***	2.816***	3.895***	3.917***	3.333***	3.078***
	(13.16)	(11.44)	(10.73)	(10.78)	(11.89)	(10.14)	(9.60)	(9.10)
SMD	-16.333***		-14.271***	-13.604**	-18.397***		-16.568***	-18.574**
	(3.39)		(3.37)	(2.68)	(3.18)		(3.07)	(2.82)
LnDM		3.400*				2.695		
		(2.00)				(1.28)		
Open			-44.628**	-62.178***			-38.798	-55.582*
			(2.17)	(2.99)			(1.48)	(2.06)
ΔXR3			0.135***	0.121***			0.112**	0.113**
			(3.28)	(3.12)			(2.14)	(2.26)
LnAraPop				3.236				0.221
				(0.46)				(0.02)
LnPop				-2.728*				-1.755
				(2.13)				(1.06)
LnEnergy				3.427				10.444*
				(0.85)				(2.01)
Adj-R^2	0.893	0.861	0.943	0.955	0.873	0.825	0.922	0.936
N. Obs.	24	24	22	22	24	24	22	22

Absolute value of t-statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%
Regressions including ΔXR3 omit Luxembourg; those including Open omit Iceland

Table Two: Prices Excluding Tax

	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
	GDP Price				Consumption Price			
Constant	45.717***	38.482***	55.675***	67.685***	40.901***	33.930***	49.018***	51.984**
	(9.86)	(7.16)	(12.04)	(5.17)	(6.86)	(4.80)	(7.60)	(2.91)
CGDP	3.447***	3.441***	2.972***	2.922***	3.736***	3.759***	3.354***	3.178***
	(16.01)	(14.03)	(13.19)	(11.58)	(13.50)	(11.67)	(10.66)	(9.21)
SMD	-12.361***		-11.455***	-11.217**	-14.359***		-13.650**	-15.791**
	(3.25)		(3.28)	(2.28)	(2.94)		(2.80)	(2.35)
LnDM		2.539*				1.878		
		(1.90)				(1.07)		
Open			-30.128*	-38.809*			-25.073	-32.462
			(1.78)	(1.93)			(1.06)	(1.18)
ΔXR3			0.105***	0.099**			0.084*	0.091*
			(3.10)	(2.64)			(1.76)	(1.78)
LnAraPop				1.995				-0.999
				(0.29)				(0.11)
LnPop				-1.282				-0.345
				(1.04)				(0.20)
LnEnergy				1.380				7.699
				(0.36)				(1.45)
Adj-R^2	0.923	0.902	0.956	0.952	0.896	0.861	0.928	0.925
N. Obs.	24	24	22	22	24	24	22	22

Absolute value of t-statistics in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%
Regressions including ΔXR3 omit Luxembourg; those including Open omit Iceland

Table Three: Summary Statistics

	Obs	Mean	St. Dev.	Min	Max
GDP	24	117.539	29.247	43.06	162.56
Consumption	24	118.008	32.166	41.81	168.71
GDP, no tax	24	110.849	27.225	41.48	162.56
Cons., no tax	24	111.292	30.034	40.27	166.64
CGDP	24	19.643	7.335	2.69	34.03
SMD	24	.208	0.415	0	1.00
LnDM	24	1.878	1.350	0	5.01
Open	23	.024	0.118	-.17	.34
ΔXR3	24	-4.328	44.703	-204.36	17.45
LnAraPop	24	.333	0.303	.03	1.34
LnPop	24	9.448	1.647	5.54	12.43
LnEnergy	24	.581	0.427	.01	2.04

Correlations
(obs=23)

	GDP	Cons.	GDP, no tax	Cons., no tax	CGDP	SMD	LnDM	Open	ΔXR3	LnAra Pop	LnPop	LnEne rgy
GDP	1.000											
Consump.	0.985	1.000										
GDP, no tax	0.991	0.980	1.000									
Con, no tax	0.973	0.992	0.985	1.000								
CGDP	0.922	0.914	0.945	0.932	1.000							
SMD	-0.300	-0.303	-0.261	-0.266	-0.078	1.000						
LnDM	0.291	0.247	0.263	0.220	0.147	-0.730	1.000					
Open	-0.464	-0.480	-0.434	-0.451	-0.281	0.315	-0.179	1.000				
ΔXR3	0.597	0.558	0.593	0.553	0.536	0.102	0.034	-0.072	1.000			
LnAraPop	-0.273	-0.288	-0.248	-0.266	-0.098	0.644	-0.532	0.564	0.011	1.000		
LnPop	-0.224	-0.176	-0.176	-0.130	-0.132	0.248	-0.259	-0.355	-0.209	-0.092	1.000	
LnEnergy	0.099	0.164	0.097	0.159	0.168	0.449	-0.314	0.015	0.064	0.347	0.050	1.000

Figure 1: Stigler-Peltzman Regulation

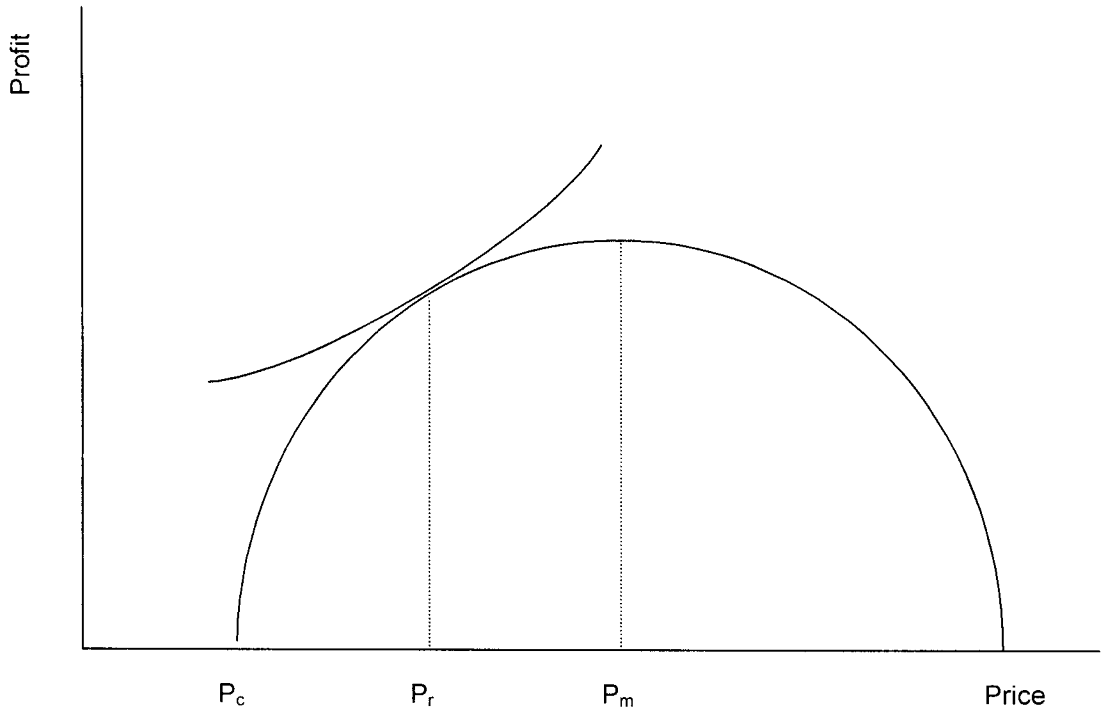

Figure Two: Two Party Seat-Vote Functions