Chapter 15: Economics and Politics

Introduction: Politics, Law, and Economics

Chapter 14 demonstrated that laws that assure voluntary exchanges tend to increase the extent of markets for reasons that are neglected by the core neoclassical models. In the core neoclassical models, the existence of well-enforced systems of ownership and contract is simply assumed rather than a joint consequence of the decisions of potential lawbreakers, law enforcers, and legislators. The implicit legal systems (1) characterize who owns what (what neoclassical models refer to as initial endowments), (2) provide a basis for voluntary exchange (ownership is transferable), and (3) facilitate exchange by outlawing fraudulent transactions and theft. Such rules may have initially emerged as customary laws in communities where voluntary exchange first emerged. As time passed, customary laws were normally reinforced (or undermined) by formal laws adopted by community governments.

Honest enforcement of a community's laws may initially emerge as part of a community's normative systems, but as formal law enforcement systems are adopted, they become consequences of governmental policies.

This chapter uses rational choice models to analyze these and other governmental decisions that affect the extent of trade, trade networks, and economic growth rates. As in many of the previous chapters, the topics covered are a small subset of ones covered in the broader academic literature on political economy. The topics covered are ones that have attracted a good deal of attention, and which have the most obvious effects on the extent of markets. The relatively straight-forward models reviewed ground most others.

The political economy models developed can account for a wide variety of policy choices by rational rulers, voters, politicians, and other politically active persons. Since "people are people," the same models of human interests are employed to analyze governmental decisions as have been used to analyze the decisions of consumers and firms.

However, governmental decisions differ from those of markets because of differences in choice settings. For example, during elections, the alternatives are candidates or rules rather than goods, services, and production methods. And, a voter's choice only partially determines the candidate elected or referenda outcome.

The first part of the chapter focuses on different forms of government, and how those differences affect policy decisions. The second part of the chapter focuses on policy choices within democracies. Both parts demonstrate that rational choice models can provide insights into the policy choices of governments and their consequences. Although some consequences of governmental policies are accidental, most are joint products of interests of the individuals involved and the choice setting characterized by political institutions.

In the first sections, two extreme forms of government are examined. The first is an extractive regime of the sort first modelled by Mancur Olson (1993). The second is a relatively lean model of elections and democratic policy decisions.

As with most of the topics covered in part III of this book, this material was largely developed by economists in the post-World War II period. Most models of democratic decision making are grounded in papers and books by Duncan Black (1948) and Anthony Downs (1957a, 1957b). These and other models were extended by many scholars working in the fields of public choice and political economy in the second half of the twentieth century and early twenty-first century.

The persons contributing to these fields of study used more or less standard neoclassical assumptions about the interests of individuals. For the most part, the relevant decision makers are assumed to be pragmatists of the usual neoclassical variety. That characterization provides a logical consistency between the behaviors modelled in Parts I and II and those modelled in this chapter. The possibility that voters have internalized norms or ideologies that affect their behavior as rulers or voters is taken up in chapter 16.

Authoritarian Regimes as Stationary Bandits

The simplest model of the origin of government is the one suggested by Mancur Olson in his widely cited 1993 paper in the *American Political Science Review*. He suggests that governments emerge through coercion as a "roving bandit" (or team of roving bandits) settles down and is able to exclude other roving bandits from his, her, or their territory.

Olson argues that in regions where there are numerous roving bandits, theft is commonplace and, as a consequence, there is little security in life or property, or in products that one might produce. In such environments, as demonstrated in chapter 14, economic output tends to be much diminished, because the risk of theft is high. Such societies are not necessarily as bad as that suggested by Hobbes, but their economies are much smaller and the people

living there are much less comfortable than they would have been in the absence of the roving bandits.

In contrast, in a region controlled by a stationary bandit or partnership of such bandits, theft is less commonplace because stationary bandits have good economic reasons to restrain their "harvests" from the folks living in the territory.

Olson's pragmatic stationary bandit adopts an extractive form of government—he or she attempts to maximize the revenues obtained by rule making and taxation. In contrast to a roving bandit, a stationary bandit attempts to maximize the present discounted value of its long-term "profits" from ruling its territory.

Olson's theory notes that a stationary bandit's interest in future revenue constrains his, her, or their current taxes, takings, and other extractions. The rulers have good economic reasons to provide a legal system, roads, and territorial defense, because they increase the ruling group's net income. A forward-looking rational ruler would provide all services that increase their net revenues.[1]

Game matrix 15.1 illustrates the basic logic of Olson's argument. It assumes that as the total number of raids increases, the output available for theft tends to diminish for reasons developed in chapter 14. In the case illustrated, the expected returns from purchasing and producing goods diminish as thievery increases. At some point, this diminution induces fewer raids by thieves, because their "pickings" fall below the marginal cost of a raid, but at that point the communities being raided have been reduced to near subsistence levels of production.

At the Nash equilibrium depicted, each gang of thieves raids the village or community of interest 10 times each in the period of interest (a month or a week). Underlines are used to characterize each gang's best reply function. Single underlines trace out the best reply function for gang 1 and double underlines trace out the best reply function for gang 2.

[1] It should be acknowledged that not all of a stationary bandit's revenue would be spent on palaces, parades, and parties. There are many other entertaining pursuits that a ruler may undertake in his, her, or their spare time. For example, power itself has evidently been valued by many rulers. Nonetheless, maximizing long-term revenues remains in the interest of even power-hungry stationary bandits. Revenue is a means rather than an end. There are many ways that revenue can be spent to increase or indicate a ruler's power.

Notice that in this case there is no pure dominant strategy. Although 10 raids are often a good strategy for each gang, it is not always the best one.

Table 15.1 A Game Matrix Characterization of the Olson Stationary Bandit Model

	Revenue for Roving Bandit 2 (Number of Raids)			
Roving Bandit 1	0	5	10	15
0	0, 0	0, 150	0, 135	0, 120
5	150, 0	75, 75	35, 90	25, 75
10	135, 0	90, 35	**50, 50**	30, 45
15	120, 0	75, 25	45, 30	25, 25

Notice also that the total number of raids diminishes if there is only one gang. In that case, the outcome reflects the number of raids by a stationary or monopoly bandit. In the illustration, such a bandit or bandit team engages in just 5 raids in the period of interest. Less frequent raids (lower tributes or taxes) reduce risks for producers to some extent. As the probability of theft falls, markets expand, and the community's average income increases. This, as demonstrated in Chapter 14, tends to make production and employment more profitable, which increases the extent of economic activity.

The additional harvest, in turn, provides the stationary bandit with a larger pool of resources to take (or tax base) than in the roving bandit setting.[2] The net-revenue maximizing model of a region's ruling organization (government) is sometimes referred to as the leviathan model.

[2] Olson assumes that stationary bandits use taxes rather than raids, but this form of extraction requires quite a bit of sophistication and new institutions to develop and implement. That raids continue—at least initially—is more plausible. Such raids are similar to taxes although, by being random takings, they are likely to reduce purchases and production by more than extortion or tax systems that generate the same net revenues, because risks increase at the same time that the wealth of those expropriated is reduced, whereas under systematic taxation only the latter occurs. Such possibilities are likely to lead to the adoption of tax systems by the ruling group when it recognizes that taxes produce more net revenues than raids. Innovations are possible for thieves and governments as well as firms and consumers.

Net Revenue Maximization by Governments

Consider a stationary bandit who adjusts his probability of theft to maximize net revenues. We'll begin by assuming that the goods of interest are locally produced by farmers and/or community artisans and that their output is partly determined by the rate at which their products are stolen between production and sales, F^F.

Equation 14.12, $Q^* = s(P^O, Y, w, F^F)$, can be used as the basis for characterizing how the probability of a raid affects a community's average output (the stationary bandit's tax base). Because we are explicitly taking account of government services, variable G will be added to function s to make $Q^* = s(G, P^O, Y, w, F^F)$. F^F is now interpreted as the probability that an average firm is raided, and M is the number of producers in the territory ruled by the stationary bandit, who we'll refer to as Big Al. Initially, we'll assume that a stationary bandit provides no other services than excluding roving bandits; thus, in the first model, G=0.

Given this, Big Al's revenue is $R = F^F M s(G, P^O, Y, w, F^F)$. The cost of raids and service G is assumed to be simply $C = c(G, F^F, M, D)$ where D is the fixed cost of defending the community from external bandits. Thus, Big Al's expected net revenue from raids is:

$$\Pi^e = F^F M s(G, P^O, Y, w, F^F) - [c(G, F^F, M, D)] \quad (15.1)$$

The profit maximizing frequency of raids (or extent of government taxes) can be characterized by differentiating with respect to F^F and setting the derivatives equal to zero.

$$\Pi^e_{F^F} = [Ms(G, P^O, Y, w, F^F) + F^F \mathrm{Ms}_{F^F}] - [\mathrm{c}_{F^F}] = 0 \equiv H \; at \; F^{F*} \quad (15.2)$$

As usual, the first order condition for profit maximization can be thought of as setting marginal revenue (the term inside the first pair of brackets) equal to marginal cost (the term in the second pair of brackets). However, in this case, profits are not generated by producing and selling goods, but rather from periodically raiding the firms in a territory ruled by a stationary bandit.

The implicit function theorem implies that Al's optimal frequency of raids can be characterized as:

$$F^{F*} = f(G, P^O, Y, w, \mathrm{M}, \mathrm{D}) \quad (15.3)$$

This pattern of raiding should be thought of as the steady state level—rather than that associated with a single raid or year of raids. Our results from chapter 14 imply that as long

as the stationary bandit engages in fewer raids of approximately the same size (as a proportion of the holdings of the firms raided), the total output of the community increases—even if the ruler provides no services other than excluding roving bandits.

Comparative statics with respect to the assumed parameters of Big Al's choice problem (here, $G, P^{O}, Y, w, \mathrm{M}, \text{and } \mathrm{D}$) can be undertaken in the usual way. Parameter D (territorial defense) does not affect the probability of raids, but rather partially determines whether it is profitable to become a stationary bandit or not. It is a fixed cost, as far as this model is concerned. Net revenues at the optimal stationary raiding rate must be at least D greater than that obtained from being a roving bandit for this to be worthwhile.

A More Complete Leviathan Model

Olson's model, in contrast to the simple leviathan model, notes that a ruler's profits can be increased by providing services to his, her, or their territory that increase its prosperity. The ruler does this not out of generosity (although he or she may claim so), but because it increases the government's net "harvest." Such productive services include the enforcement of contracts and laws against theft from other local bandits, pathway construction and maintenance, or public education.

An increase in the provision of market extending services, G, has the opposite effect on a firm's output decision that raids have. G increases output—holding other factors constant. To model this choice, we'll use the envelope theorem.

Given this, Big Al's maximal revenue function is characterized by equation 15.3. Big Al's maximal expected net revenue from raids and productive services can be characterized as:

$$\Pi^{*} = F^{F^{*}} Ms\left(\mathrm{G}, P^{O}, Y, w, F^{F^{*}}\right) - c(G, F^{F^{*}}, M, D) \qquad (15.4)$$

The profit maximizing government service level can be characterized by differentiating with respect to G, then setting those partial derivatives equal to zero.

$$\Pi^{*}{}_{G} = \left[F^{F^{*}} \mathrm{Ms}_{G}\right] - \left[\mathrm{c}_{G}\right] = 0 \qquad (15.5)$$

Note that this first order condition requires setting the expected marginal revenue of government services equal to its marginal cost. Because we are focusing on the profit maximizing raiding rate, the first order condition of 15.2 also holds at this characterization of the net revenues combination of raids and government services.

Although the model is similar to the neoclassical model of the firm, profits in this choice setting are not generated by producing and selling goods, but rather from periodically raiding (stealing) from the firms in the territory ruled by a stationary bandit and by providing services that tend to encourage greater production on the part of the firms being raided.

The Olson model of authoritarian rule can be generalized in various ways. For example, each of the several types of expenditures that can add to community's economic output could be explicitly in the government's list of control variables. Time can be explicitly taken into account by explicitly using present discounted values for the future revenues and costs associated with ruling. The probability of coup or civil war may be included as a risk factor that affects the stationary bandit's risk-adjusted returns and planning horizon.

However, for the purposes of this chapter, it is the reduction in unlawfulness associated with a stationary bandit environment that is of greatest interest.

In combination with the results from the previous chapter, it implies that even the simplest form of government has effects on the extent of markets. When rulers are pragmatists, they tend to extend the markets within their territories relative to what would have occurred when thievery and conflict resemble that of the Hobbesian setting.

The degree of improvement varies with the efficiency of a government's extractive policies, the market enhancing services that it provides, the cost of excluding roving bandits, and the time horizon of the stationary bandit. Governmental choices have economic consequences.

The Policy Choices of a Liberal Democracy

The authoritarian model can be regarded as the political analogue to a monopoly market in economics. Resident mobility is assumed to be limited and the power of the government is assumed to be sufficient to determine the "price" of residence.

We now shift to a setting where governmental policies are determined by competitive elections among two candidates or two parties for the authority to govern. Historically, democratic governments have been relatively rare, which suggests that such governments may be difficult to establish and once established may be somewhat fragile. Nonetheless, democracies have been associated with the regions with the most extensive economies for most of the past two centuries. They are, thus, of potential interest for a course on microeconomics, because the scope of market activities was correlated with democratization in Europe, North America, Australia and Japan.

It turns out that if voters are as rational in the voting booth as they are in a grocery store, the electoral competition implies that government policies tend to maximize the lifetime utility of "middle of the road" voters.

The Median Voter Model

Although elections have been used to select candidates and policies for at least two millennia, the median voter model was not worked out until 1948 by Duncan Black. Once recognized, it is quite easy to illustrate the logic of this rational-choice-based game-theoretic election model.

Consider the following table that illustrates votes among three friends attempting to choose among restaurants for lunch. Each friend prefers a different quality of restaurant, which is assumed to be characterized by a number, most likely in this case its price. That number or price characterizes the type of menu, service, and ambiance of the restaurant preferred by each.

Al prefers a quick and easy lunch, and her preferred restaurant is a 10. Bob prefers a somewhat fancier restaurant, which may be a bit slower, but has a bit better selection of food and a bit more service—a restaurant of type 15. Cathy prefers a slower fancier restaurant with a still wider selection of food, that is generally tastier—a restaurant of type 21.

When choosing among the alternatives, each of the friends votes in favor of the restaurant that is closest to his or her ideal type. (This is sometimes referred to as spatial voting.) The restaurants voted over are listed on the left (each being characterized by a number, and index of restaurant quality). Each individual's vote is listed in the center, and the outcome (majority preference) is listed on the right.

Table 15.2 Illustration of the Median Voter Properties of Majority Rule Decisions

Options	Al (10)	Bob (15)	Cathy (21)	Outcome
10 vs 21	10	10	21	10
10 vs 18	10	18	18	18
13 vs 18	13	13	18	13
12 vs 13	12	13	13	13
13 vs 15	13	15	15	15
15 vs 17	15	15	17	15
15 vs 15.5	15	15	15.5	15
14.5 vs 15	14.5	15	15	15

The first four options illustrate what I refer to as the **weak form of the median voter theorem**: the median voter always votes with the majority in a two-issue or two-candidate election. Notice that the outcome column and Bob's column are identical. Bob is the median voter because his ideal point (here, his or her ideal restaurant) is exactly in the middle of the distribution of ideal points in the sense of a median. The same number of voters prefer a more expensive restaurant as prefer a less expensive one (here one each).

The last four options illustrate what I refer to as the **strong form of the median voter theorem**. In those cases, the median voter gets exactly what he or she wants, because his or her ideal point is majority preferred to every other alternative. Notice that as long as the three voters vote honestly (and spatially), even restaurants that are just a little more expensive or a little less expensive will be majority dominated by Bob's ideal restaurant.

A series of referenda in which the previous winner is one of the options on the next referendum will always exhibit the weak form of the median voter theorem. Once the median voter's preferred option is on the ballot, it will win from there on (unless the median voter changes his or her mind). In such cases, the strong form of the median voter theorem holds.

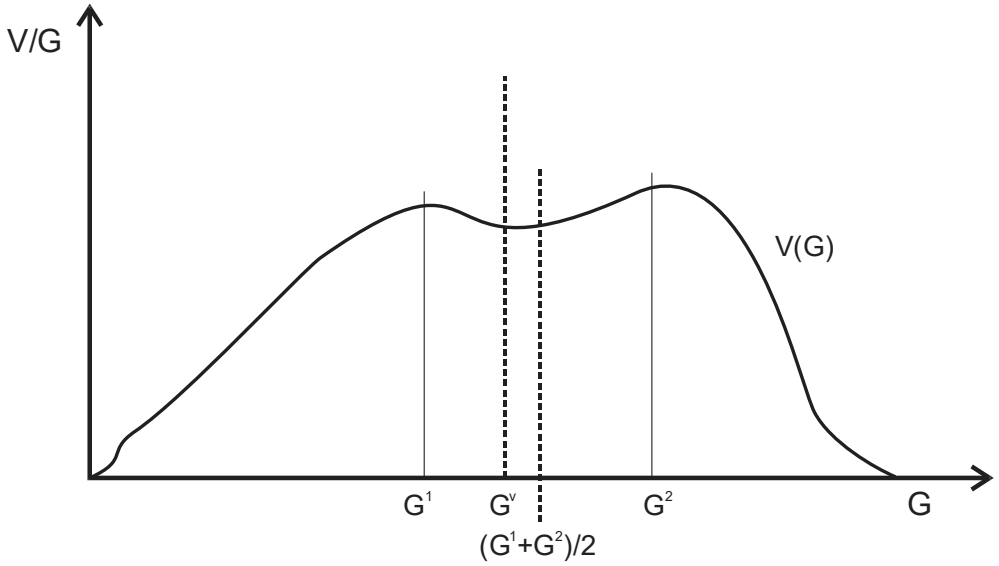
The Downsian Model of Competition Among Pragmatic Candidates

For elections to generate the strong form of the median voter theorem, some institutional support is necessary. In the above table, it was assumed that the winner in the previous vote (the status quo or incumbent) was a candidate in the next round. In that case, once the median voter's ideal is on the ballot, it will remain the policy until the median voter changes his or her mind about what his or her ideal policy (or restaurant) is. Another type of institution that tends to support the strong form of the median voter theorem is competition between two pragmatic candidates (or two pragmatic political parties) for positions of government authority. By "pragmatic," it is simply meant that a candidate is more committed to winning the election than to particular policies, and thus, he, she, or they will adopt whatever policies he, she, or they believe will command majority support.

Figure 15.1 illustrates an election between two candidates in a mass election. Candidate 1 supports government service level G^1 and Candidate 2 supports government service level G^2. The curve characterizes the frequency distribution of voter ideal points. The area below the curve between any two points on the horizontal axis is the number of voters that have ideal points between the two points chosen. The median voter prefers government service level G^V. He, she, or they have the position at the median of the distribution of voter ideal

points, so the area under the frequency distribution curve to the left of G^V is exactly the same as the area to the right of G^V. (Keep in mind that the mean, mode, and median of a distribution may be different points unless the distribution is symmetrically distributed about the mean and unimodal.)[3]

Figure 15.1 The Downsian Median Voter Model



Exactly halfway between the policy positions of the two candidates is the "indifferent voter." He, she, or they are indifferent between the two candidates because his, her, or their ideal point is exactly halfway between those of the two candidates. Being spatial voters, equidistance implies indifference. The indifferent voter position is $G^{ind}=(G^1+G^2)/2$. Every voter to the left of the indifferent voters' ideal point (to the left of G^{ind}) votes for candidate

[3] What is an ideal point? In most cases, it is simply an individual's utility or expected utility maximizing vector of government services. In a simple, two-dimensional choice model it can be thought of as the level of G that maximizes U=u(C, G) where C is private consumption and G is a service that is more or less uniformly available to everyone. Consumption is based on after-tax income, $C_i=(1-t_i)Y_i$. And, the tax rate is one's share of the cost of the government service that one pays for, $t_i = s_i(G)$. Substituting, we can write a typical voter's utility function as: U=u((1-s(G))Yi, G). Differentiating this with respect to G yields, $U_C(-S_G)Yi + U_G = 0$ at G*. This implies that $G_i^* = g(Y_i)$. Gi* is voter i's ideal point. The spatial voting model provides a useful approximation for this evaluation process—one that is precise only if the MC and MB curves are linear (e.g. the first and second terms in the first order condition).

1, and everyone to the right of that ideal point votes for candidate 2. Why? Because their own ideal points are closer to that of their preferred candidate than to the other.

The winner of an election is the candidate that gets the most votes. Given a diagram such as 15.1, one can often determine this by inspection. One can look at the candidate positions, determine their vote shares (shade the relevant areas in, mentally or with a marker) and observe whether the area to the left or right of the indifferent voter is largest.[4] As drawn, the area to the right of the indifferent voter's ideal point is larger than the area to the left of that government service level and so candidate 1 wins.

If you think a bit about the geometry of the diagram, however, you'll notice that there is another way to determine who wins. One can simply determine which candidate (or party) is closest to the median voter. The one that is closest wins, because that candidate (or party) always gets half the vote, plus a bit more. Thus, the weak form of the median voter theorem always holds in this type of election (e.g., in a single-dimensional policy space, with two candidates, a known distribution of voter ideal points, and honest spatial voting).

Given that property, it turns out that if polls are suggesting that a candidate will lose in an upcoming election, he or she should move closer to the median voter if he or she wants to increase his or her likelihood of winning. As such adjustments are undertaken by both candidates, their stated policy positions tend to converge toward the median voter's ideal point. At the Nash equilibrium of the electoral contest, both candidates adopt identical positions at the median voter's ideal, and the strong form of the median voter theorem will hold (if the candidates are honest and can effectively press for their stated policies after being elected). Another implication of the Nash equilibrium is that electoral outcomes tend to be close—in fact, a statistical tie.[5]

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[4] If one has a concrete functional form for V(G), one can also calculate the definite integral of V(G) from minus infinity to $G^{ind}=(G^1+G^2)/2$, which is the vote received by candidate 1, and the definite integral from $G^{ind}=(G^1+G^2)/2$ to positive infinity and compare the numbers calculated to determine which is larger.

[5] Indeed, if candidate positions have converged to G^V, then every voter will mentally "toss a coin" to determine which candidate to vote for. If the candidates stay just a bit apart and are on either side of the median voter, only the indifferent voters toss coins (who may be the median voters in this case). The final vote tally would again be close, but it would also be a random event, because of the mental coin tossing of all indifferent voters and/or their "decisions" to vote or not and whom to vote for.

One test of the extent of convergence is whether you can imagine each candidate reading the other's speeches on the policy of interest. If you can (or nearly so) then convergence has taken place. If not, then full or nearly full convergence has not occurred. The latter can happen for various reasons including that neither candidate is a pragmatist.

It bears noting that to apply the logic of the Downsian model, one often has to take electoral institutions into account. For example, presidents in the United States are not directly elected, but indirectly elected by electors. The winner is not the candidate with the most votes, but the one with the most electoral votes. Were voter preferences in every state the same, this institution would not matter much. But since they are not, it turns out that some states are more likely to ultimately determine the election than others. When applied to that electoral system, the Downsian model implies that elections in pivotal states will be closer, possibly much closer, than the national vote tabulations.

Similarly, in proportional representation systems, a single party rarely wins a majority of the votes and has to form a majority coalition to take control of the executive branch. Under that form of government, coalitions of parties usually rule. Insofar as coalitions of parties that are ideologically closest to one another are more likely to form such coalitions, it turns out that the median voter is very likely to have voted for one of the parties that make up the coalition government, as is the case with "center-left" or "center-right" coalition governments.

Notice that in none of these cases is the median voter a "representative" agent as is often assumed in microeconomic and macroeconomic models. Rather he or she is the pivotal voter in all close elections—where closeness is partly determined by votes and partly by a polity's electoral institutions.

Using the Strong Form of the Median Voter Theorem to Model Policy Choices

If we adopt the strong form of the median voter theorem, then we can model the policies adopted in democracies as those which maximize the utility or expected utility of the median voter. We'll do that first for a general policy and then for crime in order to follow up on the policy focused on above and in chapter 14. The simplest model of such decisions is a two good model analogous to that used to model a consumer's choice of an ideal combination of two goods given his or her budget constraint.[6]

[6] The one government service and one private good model is also more likely to have a median voter equilibrium than a model with more government services. Not all distributions

An Illustrative Example of the Median Voter's Demand for a Government Service

Suppose that Bobby is the median voter and has a strictly concave twice differentiable utility function defined over his or her private consumption (X) and the public good (G) of interest. U=u(X, G). U is, as usual, assumed to be monotonically increasing in the two goods (X and G) and subject to diminishing returns (e.g., the utility generated by both goods exhibits diminishing marginal utility). Suppose that Bobby's income is Y, that the cost of private consumption is P and Bobby's cost share for the public service can be characterized as C=c(G,Y). In that case, Bobby's budget constraint is Y=PX + c(G,Y). Notice that the budget constraint implies that we can characterize X as X = (Y-c(G,Y))/P, which allows us to use the substitution method to characterize Bobby's utility (along his or her budget constraint) as:

$$U = u(\frac{[Y-c(G,Y)]}{P}, G) \quad (15.8)$$

Differentiating with respect to G and setting the result equal to zero characterizes Bobby's ideal level of G (his or her ideal point, in the diagrams above).

$$U_G = u_X\left(-\frac{C_G}{P}\right) + u_G = 0 \equiv H \ \ at\ G^* \quad (15.9)$$

As in consumer choice models, voters prefer the government service level that sets their marginal benefits (the second term) equal to their marginal costs (the first term).

Applying the implicit function theorem to equation 15.9 implies that Bobby's ideal level of the government service of interest can be characterized as:

$$G^* = g(Y, P) \quad (15.10)$$

The effect of changes in personal income (Y) and the cost of private consumption can be characterized (qualitatively) using the implicit function differentiation rule.

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of voters have such an equilibrium, but most do when voters are rational in the usual sense and have similar tastes for government services and personal consumption. See Plott (1967) for the symmetry conditions that characterize a multidimensional distribution of voter ideal points with a single median or pivotal voter.

$$G_Y^* = \frac{H_Y}{-H_G} = \frac{u_{XX}\left(\frac{1-C_Y}{P}\right)\left(-\frac{C_G}{P}\right)+u_X\left(-\frac{C_{GY}}{P}\right)+u_{GX}\left(\frac{1-C_Y}{P}\right)}{-U_{GG}} > 0 \quad \text{(if } C_Y \text{ and } C_{GY} \text{ are small)} \qquad (15.11)$$

Given that the denominator is positive (the second derivative of U with respect to G is negative and that term is pre-multiplied by a negative sign), the numerator determines the sign of equation 15.11.

The progressivity of the tax schedule plays an important role in this determination. If Bobby's cost share for the service of interest is not affected by his or her income, then $C_{GY} = 0$. In that case, the numerator includes only terms that are greater than zero. In such cases, the demand for government services is a normal good, and the quantity demanded increases with income. However, if cost shares rise with income, the opposite may occur because of the "price" effects of income taxation. Such a result requires the middle term to be larger than the other two terms. In such cases, the effects of income on cost shares may dominate the marginal benefit effects of increased government service. In such cases, the demand for public services resembles that of inferior goods; the quantity demanded would fall as income increases. However, in this case, the demand function is not necessarily an inferior good. Rather, the marginal cost of government services rises as one's income (taxable income) increases. If that cost effect is large enough, higher income people may prefer fewer services than lower income people.

In cases in which voters have similar utility functions and vary chiefly because of differences in income, income can be used to characterize the median voter. In such cases, he or she is the person with median income and the median voter's preferred service level is $G^* = g(Y^{median}, P)$. Note that this holds as long as the demand for the government service of interest is monotone increasing or monotone decreasing in income.

The Median Voter's Demand for Theft Prevention

In addition to government services that are demanded because they are elements in one's utility function, there are also services demanded because they reduce risks and/or uncertainty. For example, most governments provide a variety of insurance-like products that reduce the variability of income (as with, for example, unemployment insurance and tax-financed retirement pensions), or other types of insurance such as tax-financed health insurance or flood insurance. Other government services attempt to directly alter risks as with criminal-justice systems and national defense.

Risk management services require somewhat more complex models of voter choice because demands for such services are indirect rather than direct. They are based on the desirable effects of such services on risk or uncertainty, rather than personal use or consumption. Voters would prefer to be healthy rather than ill enough to qualify for tax-financed healthcare services. Many of these services and the methods used to finance them have direct effects on markets.

Enforcement of laws that tend to discourage theft and fraud while encouraging capital accumulation and innovation tend to extend markets for reasons developed in the chapters on entrepreneurship and law and economics. Although both consumers and firm owners are affected by such crimes, we'll focus on consumers, because they are more likely to be the median voter than owners of firms.

A Model of a Median Voter's Demand for Law Enforcement

Recall the model toward the end of chapter 14 that modelled the effect of thievery on the demand and supply of types of goods that are likely to be stolen. The objective function of the j[th] consumer-voter who is considering the purchase of a good at risk for thievery (here, good 1) from chapter 14 is reproduced below.

$$U_j^e = (1 - F^C)U\left(Q_1, \frac{W_j - P_1Q_1}{P_2}\right) + F^C U(0, \frac{W_j - P_1Q_1}{P_2}) \qquad (15.6)$$

To adapt this model for use in a median voter model, we distinguish among individuals (here by personal wealth or income, W_j), and take into consideration the fact that a democratic government can reduce crime rates through expenditures on police and courts. Those expenditures, G, are not free and the manner in which the cost of the criminal-justice system is divided up among taxpayers also influences a voter's demand for law enforcement.

Chapter 14 also includes a model of rational criminal behavior that implies that the number of crimes falls as the probability of being caught and punished increases. That probability is assumed to increase as government expenditures on law enforcement, G, increases. In addition to his or her risk of punishment, a criminal's optimal level of criminal activity also is affected by w_i^0, the opportunity cost wage of a potential thief.

$$N_i^* = n_i(w_i^0, G) \qquad (15.7)$$

For the purposes of this chapter, we use the previous results to write the probability of being a victim of theft as $F^c = f(G)$. As the number of thefts per criminal diminishes and the

number of criminals diminishes, the probability that any given individual is the victim of theft also naturally diminishes. The results of Chapter 14 imply that the probability of being subject to a crime, $F^C(G)$, is a monotone decreasing function of G. We'll also assume for the purposes of this chapter that it is subject to diminishing returns. We'll neglect the effect of the opportunity cost wage on crime in the voter-consumer model of the demand for government expenditures on law enforcement, although the average opportunity cost wage of a criminal can be easily added as a parameter of the expected utility maximization problem developed below.

Recall that we attributed most of the effect of expenditures on the criminal justice system to the incentive effect of expected punishments, rather than to specific forms of punishment. The probability of being caught and punished affects all criminals, not just those who are caught and punished.

With these effects and the results of chapter 14 in mind, a typical voter-consumer's expected utility for a given level of law enforcement, given his or her optimal purchase of "risky" good 1, can be written as:

$$U_j^e = (1 - F^C)U\left(Q_1^*, \frac{W_j - c(G,W_j) - P_1Q_1}{P_2}\right) + F^C U(0, \frac{W_j - c(G,W_j) - P_1Q_1}{P_2}) \qquad (15.12)$$

where Q_1^* is the consumer's ideal purchase of the potentially stolen good, as characterized in chapter 14, and c(G, W_j) is the voter j's cost share for expenditures on law enforcement (G), which may vary with his or her wealth or income.

As written, the voter has already calculated his or her ideal purchase of good 1, for various parameters of the choice setting, and that result has been substituted into the expected utility function. This substitution allows us to use the envelope theorem to characterize his or her demand for law enforcement by differentiating equation 15.12 with respect to G and setting the result equal to zero. To simplify the notation, the utility associated with theft is denoted U^0.

The use of this substitution method together with the envelope theorem allows a voter's demand for law enforcement to be characterized with a single first order condition. Recall that the envelope theorem implies that we can focus on the derivatives of G on all the variables except Q_1^*, which has already been optimized. The resulting first order condition is:

$$(1 - F^C)U_{Q_2}(-C_G/P_2) - F_G^C U + (F^C)U_{Q_2}^0(-C_G/P_2) + F_G^C U^0 = 0 \; at \; G^* \qquad (15.13)$$

The implicit function theorem allows that demand to be characterized as:

$$G_j^* = g(W_j, P_1, P_2) \quad (15.14)$$

A voter's interest in law enforcement of this type (e.g., anti-theft or anti-fraud laws) is motivated by their effects on his or her expected net gains from trade. These effects are generated by reductions in the risks associated with a subset of market transactions—specifically those associated with purchases of goods that attract the interest of thieves in this case.

If voter preferences (utility functions) are similar, then the distribution of voter demands for law enforcement is determined by median income or wealth. In that case, the median voter's demand can be written as:

$$G^* = g(W^{median}, P_1, P_2) \quad (15.15)$$

In cases in which the strong form of the median voter theorem holds, this will be the observed pattern of expenditures on law enforcement.

Values for the other endogenous variables can be determined by substituting G* into the tax schedule C, the demand for good 1, the utility function, and the criminal choice function. Note that government expenditures of this type have many direct and indirect effects on the pattern of exchange and employment in both the private and government sectors of the economy.

A general implication of this type of model is that rational voters favor expenditures on risk reducing activities up to the point where the expected marginal gains (from reductions in expected losses [risks]) equal the expected marginal cost of expenditures on law enforcement (risk reducing government services). The greater the marginal harm associated with a given type of risk, the more voters are willing to spend (in this case through government taxes) to have such risks reduced.

Many of these risk-reducing government policies, perhaps most, affect the extent and rates at which markets emerge, extend, and flourish.

Governance, Law Enforcement, and the Extent of Markets

The analysis toward the end of chapter 14 showed why crime rates affect the extent of markets. By increasing the risks for consumers and firms, purchases of goods that are frequently stolen fall and the production of goods prone to pilfering also fall. As a

consequence, markets are smaller and fewer gains from trade are realized. The same sorts of effects are associated with fraud. Thus, insofar as governments devote resources to reducing market-relevant crime rates and succeed at reducing the risk of losses from those crimes, markets tend to expand. Insofar as they do not, markets tend to contract—other things being equal.

The analysis of this chapter suggests that governments of all sorts can potentially reduce crime rates, and therefore have at least some beneficial effects on markets—whenever the alternative is an onslaught of roving bandits or simply independent criminals who choose illegal means for generating their personal incomes. However, it does not imply that all forms of government are equally interested in pursuing criminals.

The simple leviathan model suggests that little or no effort may be invested in curtailing local crimes—although roving bandits would be excluded, and thus crime rates would fall to some degree. The Olson model of a more sophisticated autocrat implies that market-relevant local crimes will be curtailed up to the point where the marginal increase in tax revenues equals the marginal cost of crime reduction—which is the level that maximizes expected profits (net revenues) for the ruler or ruling group.

The manner in which stationary bandits collect their revenue may resemble theft—particularly in times when taxes were difficult to collect from unwilling taxpayers. However, other illegal thievery would be reduced but not to zero. Indeed, one can imagine cases in which an authoritarian allows local organized crime to continue almost unabated, if the criminal organizations share their profits with the rulers. Regular tax schedules, as they emerge and replace government raids and extortion, would further reduce risks for firms (and consumers) and therefore expand markets and potential revenues for the government. This may account for the emergence of standing tax laws and tax schedules.

Within democracies, the interests of pivotal voters in decreasing crime rates are likely to be more personal than community-wide, but insofar as the typical consumer is more risk averse than the average stationary bandit, they are likely to favor greater efforts to curtail crime than an autocrat would in similar circumstances. Their chief interest is personal safety and the protection of their property rather than the government's net revenues, although the cost of law enforcement also influences the decisions of rational voters.

Differences between the interests of autocrats and median voters also suggest that the pattern of government services differs under these two systems of governance. Voters

support the government provision of risk reducing services and also of goods and services that they directly consume, with little attention paid to their effects on government net revenues. Stationary bandits, in contrast, provide only services that add to their expected net revenues. Thus, there are many services that are provided in democracies that would not be provided by an Olsonian type of authoritarian regime (or would be provided at far lower rates). Many government services increase voter utility, without increasing their nation's tax base—as might be said of parks and social safety nets.

The Democratic Poverty Trap

There are also cases in which a well-functioning democracy may adopt policies that reduce the extent and growth rates of markets rather than increase them.

For example, a population of pragmatic voters has incentives to transfer resources from the "rich" to the "poor" in a manner that can undermine incentives to work, invest, innovate and produce. This section provides an illustrative model of the "over" redistribution or "overly" generous social insurance systems—where "over" in this case simply means at levels that tend to reduce the size of markets and their associated goods and services.

The "over" redistribution result is possible within democracies—even ones constrained to pass only general laws that do not target specific groups. It is not the only possible result, but both it and the others can be illustrated with a few equations and two diagrams based on the influential Meltzer and Richard (1981) model.

Suppose that a 'demogrant' or guaranteed income level (G) is to be financed with a uniform proportional tax on income of *t* percent. The revenues from that tax are to be devoted solely to providing equal lump-sum payments (demogrants) to each person in society. Voter "i" would have after-demogrant income $X_i = (1-t)Y_i + G$, where Y^i is voter i's pretax income, *t* is the tax rate, and G is the universal demogrant.[7] Because all of the demogrants are the same and financed with the same proportional tax, total outlays (NG) must equal tax revenues $(\sum_{i=1}^{N} tY_i)$ which can be written as $\mathrm{NG} = \sum_{i=1}^{N} tY_i$. If one divides both sides by N, the

[7] Support for such demogrant programs comes and goes in the West. Such programs—sometimes termed negative income taxes—were favored by both mainstream candidates in the 1972 US presidential election and have returned to prominence as proposals for universal basic income in the past decade.

balanced budget assumption also implies that the demogrant is simply *t* times average income, or $G = tY^A$, where $Y^A = (\sum_{i=1}^{N} Y_i)/N$ is average income.

Both personal and average income tend to decline as tax rates increase, thus Y_i and Y^A tend to fall as tax rates increase. (Keep in mind that transfer systems of this kind do not provide trade enhancing services; they merely redistribute income and thereby alter patterns of trade, but do not generally increase them, while the tax rates tend to reduce returns from working, capital accumulation, and innovation.)

Voter i's net income, X_i, including both tax payments and transfers is:

$$X_i = (1-t)Y_i(t) + tY^A(t) \qquad (15.16)$$

If voters are pragmatic income maximizers, each voter will favor the tax and grant combination that maximizes his or her own after-tax income. Given the assumptions above, this normally occurs when the tax rate satisfies the following first-order condition for a voter i's optimal demogrant financing proportional income tax:

$$X_{it} = [(1-t)Y_{it} - Y_i] + [Y^A + tY_t^A] = 0 \; at \; t^* \qquad (15.17)$$

where subscript *i* denotes a particular voter's income and the other subscript (t) denotes partial derivatives of voter income and average income with respect to the tax rate. The latter is a measure of the overall impact of the tax system on decisions to seek employment and/or to produce goods and services for sale in markets. The first term in brackets is voter i's marginal tax cost for the demogrant system and the last bracketed term is his or her marginal benefit from the demogrant.

The ideal tax rate from the perspective of voter i sets the marginal benefits from the demogrant equal to i's marginal tax cost.

The implicit function theorem implies that a voter's ideal tax rate varies with his or her pretax income and the average income in the country of interest.

$$t_i^* = f(Y_i, Y^A) \qquad (15.18)$$

The median voter has median income and thus the predicted level of taxation and redistribution is $t^* = f(Y^{median}, Y^A)$ and $G^* = t^*Y^A(t^*)$. This is the outcome focused on in the Meltzer–Richard paper and others based on their results.

However, the equality condition of equation 15.17, perhaps surprisingly, may never materialize. Corner solutions emerge if the distribution of income is highly skewed, and voters expect the tax system to have only "small" effects on work effort and economic development. In cases in which the tax system has only modest incentive effects and median income is less than average income (the latter being the usual case), pragmatic voters with median or lower incomes will prefer radical redistribution funded by 100% tax rates.

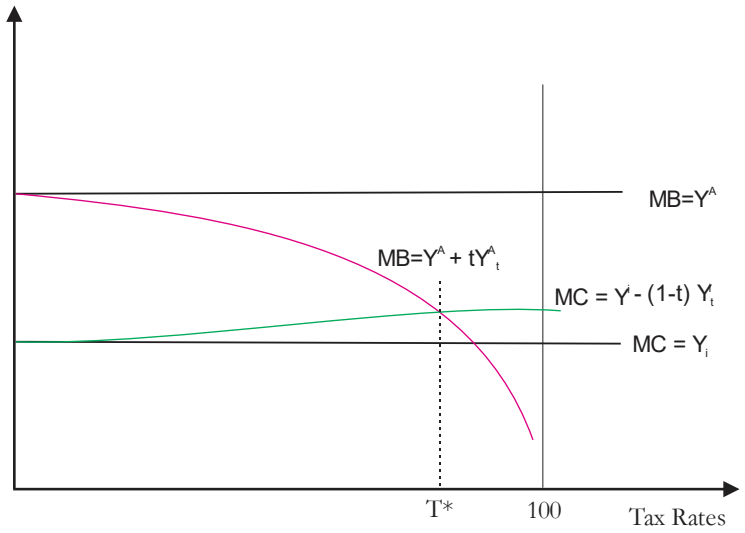
Figure 15.2 illustrates the two possible equilibria. It does so by including two pairs of marginal benefit and marginal cost curves for the median voter. The first pair illustrate the outcome characterized by equation 15.17. In that case, the median voter's MC increases with taxes and their marginal benefits fall because of effects of the tax on work effort. The incentive effects of taxation are taken into account, and the result is a tax less than 100%. It may be high or low depending on the expected incentive effects of the tax and the degree to which median income is less than average income.

The extreme case occurs when the tax is expected to have little effect on employment or output and the median voter's income is below average income. In that case, the two partial derivatives with t subscripts disappear from equation 15.17 (they have the value 0 or nearly 0). In the absence of incentive tax-induced effects, the median voter's marginal cost is his or her own income, and his or her marginal benefit is the average income in the polity of interest. In that case, full income equalization takes place.

If the incentive effects of higher taxes are believed to be "small", the median voter's marginal benefits are larger than his or her marginal cost, and a "corner solution" occurs, with $t^* = 100\%$ is favored. In that choice setting (as perceived by voters), even moderate voters prefer $t^* = 100\%$ and G = Y^A, because those values maximize their net of tax and demogrant incomes.[8]

[8] The model easily can be generalized to account for life cycles and economic growth. In a generalized model, pragmatists would maximize the present value of their lifetime incomes, where economic growth would be affected by the size of the demogrant program. The first-order conditions for ideal tax rates and demogrants conceptually would be very similar to those developed above, although the mathematical characterizations would be somewhat more complex and include new terms for time horizons, discount rates, and growth rates. The steady state model examined is thus sufficient for the purposes of this chapter.

Figure 15.2 Excessive Redistribution



The worst-case scenario occurs when median income is well below average income, and the marginal reductions in median and average income are nontrivial. T* approaches but may not reach 100%, but the economy shrinks significantly because of the high taxes and generous transfers adopted. This is the democratic poverty trap—a possibility that was much debated during the nineteenth century in Europe each time that income requirements for suffrage were reduced.

Fortunately, the worst case did not emerge as Europe gradually democratized in the nineteenth century. Indeed, the countries that democratized also tended to liberalize their economic regulations, helping economic development in the West to accelerate, with much higher growth rates than previously experienced. That acceleration continued for decades.

Theoretical Limitations of the Median Voter Model

At this point it should be acknowledged that the median voter model is not entirely robust. It has institutional prerequisites, and it is most suited for analysis of elections in which issues and candidates can be mapped into a single dimension. More than one issue can matter to voters in a given contest, but a median voter is likely to exist only if their ideals are correlated with one another, as with a left-right ideological spectrum. This normally requires that voters not all be pragmatists—those whose interests are personal and so relatively narrow—as we imagine shoppers in a grocery store or profit maximizing firms. Rational choice models of persons influenced by norms or ideologies are taken up in the next chapter.

The most important of its theoretical limitations is that there are significant policy issues over which the natural pattern of pragmatic interests will not produce a median voter. For example, imagine votes over divisions of a cake among three cake lovers. Suppose that each prefers a larger slice to a smaller one.

Let (.33, .33, .34) characterize a division between Al, Bob, and Cathy with their respective proportions listed as (A, B, C). Notice that (.4, .4, .2) is majority preferred to the first division, because Al and Bob both get a larger slice. Note that (.50, .25, .25) is majority preferred to the second division, because both Al and Cathy get a larger slice. Note, however, that the first division is majority preferred to the third, because Bob and Cathy both get a larger share. Majority preferences may generate intransitive orderings and never settle down to a clear equilibrium when voting over distributional policies is unconstrained.

Pragmatic voting over distributive issues tends to generate inconsistent, intransitive, inconclusive results, because no median outcome exists for pragmatic voters with respect to such issues. Stable outcomes in such issue spaces require either strong ideological or normative interests that override a voter's narrower pragmatic interests or an institutional design that somehow limits proposals for new divisions. (Indeed, indecision associated with cycles may provide opportunities for authoritarian takeovers, which may be one of the reasons that democracies are historically so rare.)

The stability of most Western democracies implies that one or the other of these solutions is commonplace in those democracies. An example of an institutional solution is the demogrant program analyzed above. Implementing a redistributive program may be less expensive and more likely to have an electoral equilibrium when they are rule-based, rather than individual based.

The median voter model also assumes that individual voters have sufficient information that they can make decisions about public policies in the usual manner of rational choice models—rather than being ones in which Knightian uncertainty looms large. Unfortunately, many governmental issues are sufficiently complex and not sufficiently routine that such an assumption is unlikely to be true about all policy issues. A significant dose of Knightian uncertainty would imply that mistakes may be fairly common in the voting booth or in the councils of authoritarians, and more frequent than routine decisions in grocery stores.

A Few Conclusions

This chapter shows how the rational choice models used to generate the core neoclassical models of price determination can be used to develop internally consistent, plausible models of authoritarian and democratic governments. This is not undertaken in order to demonstrate how this can be done but to provide a more complete model of how contemporary markets operate. Governmental policy choices often have economic consequences. Taking such policy decisions into account provides a more complete microeconomic model of the extent of markets and their prices than one that ignores the role of government policies and decisions.

Many other examples could have been developed because so many political choices affect markets. However, the purpose of this chapter is not to survey the entire political economy and public economics literature but to demonstrate why politics is relevant for microeconomics, and to show that microeconomics can be used to shed useful if incomplete light on the interdependencies between market and political systems.

The models developed also partially explain why laws emerged and why some activities came to be "crimes" and other not. Formal laws are adopted by government and enforced by them. Crimes are behaviors that violate those laws. In the case of authoritarian regimes, laws are adopted, and enforcement efforts attempt to advance the interests of the rulers (as they themselves understand their interests). In the case of well-functioning democracies, laws are adopted and enforced because they advance the interest of a majority (or supermajority) of voters, as voters understand them. When laws are controversial, rather than supported by a broad consensus, they tend to advance the interest of the pivotal (median) voters in the relevant electorates.

Laws and other public policies do not come from Mars (e.g., from exogenous processes that are beyond the scope of economic analysis); rather they are consequences of the same kinds of considerations that affect choices in markets. The same sorts of individuals are making decisions in each setting—so this should not be surprising.

The institutional settings in which economic and political choices are made, however, are sufficiently different that the choices need to be modelled in somewhat different ways. Governments can use coercion and coercive threats to change the rules under which market activities take place.

In neither case does the microeconomic approach explain everything, but in both cases the results are sufficiently clear and logically based that they can be used as points of departure for a more complete analysis.

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