2014

Voting Squared: Quadratic Voting in Democratic Politics

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CHICAGO

COASE-SANDOR INSTITUTE FOR LAW AND ECONOMICS WORKING PAPER NO. 657
(2D SERIES)

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THE LAW SCHOOL
THE UNIVERSITY OF CHICAGO

February 2014

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February 14, 2014

Abstract. Conventional democratic institutions aggregate preferences poorly. The norm of one-person-one-vote with majority rule treats people fairly by giving everyone an equal chance to influence outcomes, but fails to give proportional weight to people whose interests in a social outcome are stronger than those of other people—a problem that leads to the familiar phenomenon of tyranny of the majority. Various institutions that have been tried or proposed over the years to correct this problem—including supermajority rule, weighted voting, cumulative voting, "mixed constitutions," executive discretion, and judicially protected rights—all badly misfire in various ways, for example, by creating gridlock or corruption. This paper proposes a new form of political decision-making based on the theory of quadratic voting. It explains how quadratic voting solves the preference aggregation problem by giving proper weight to preferences of varying intensity, how it can be incorporated into political institutions, and why it should improve equity.

Introduction

Groups frequently make collective decisions through majority rule. Legislators pass bills by majority; shareholders make most corporate decisions by (share-weighted) majority rule, as do directors; clubs, university faculties, and civic associations typically use majority rule as well. The reason that they do so is not entirely clear. Majority rule seems fair—and certainly fairer than rule by one (dictatorship) or a minority—but it is not obviously fairer than rule by unanimity or consensus, or rule by a supermajority like two-thirds. Majority rule has some useful properties but it often fails to advance the good of the group.

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The basic problem with majority rule is well-known: majorities can disregard the legitimate interests of minorities. Imagine, for example, that a community is trying to decide whether to devote funds collected from taxes to build a park. A large minority, including elderly people and families with young children, would benefit greatly from a park; a bare majority doesn't have strong views but on balance doesn't want to spend the money. The majority can block the park even if the minority gains more from the park than the majority loses: there is no mechanism for ensuring that the majority takes into account the minority's disproportionate interests. For example, if the minority consists of 10,000 people who value the park at $100 each, and the majority consists of 11,000 people who disvalue the park at $2 each, the majority prevails even though the park generates a net social product of $978,000. More troublesome examples are easy to imagine and occur throughout history. In politics, majority rule—unrestricted by constitutional protections—permits the majority to expropriate the property of the minority, throw them in jail, and deprive them of the franchise. Even when the majority respects basic rights, it may deprive minorities of benefits and privileges that are available to others. The most prominent example from recent years, which we discuss in some numerical detail below, is the claim that the majority of Americans in various states unfairly deny the legal benefits of marriage to same-sex couples.

The possibility that the majority may disregard the interests of the minority has a well-known label: it is "tyranny of the majority."[2] But what is wrong with tyranny of the majority? One could argue that tyranny of the majority is just a negative label for "democracy," a label wielded by special interests, privileged groups, and others who fear majority rule. If all citizens are equal, what could be fairer than allowing the majority of them to determine policy, either directly or through representatives?[3]

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[2] The concept of tyranny of the majority is as old as majority rule, as will be discussed; early users of the phrase include John Adams, Alexis de Tocqueville, who popularized it, and John Stuart Mill, among others. John Adams, A Defence of the Constitutions of Government of the United States of America, Vol. 3, reprinted in The Works of John Adams 6 (Charles Francis Adams ed. 1851) (1788); Alexis de Tocqueville, Democracy in America (Arthur Goldhammer trans., Penguin Putnam 2004) (1835); John Stuart Mill, On Liberty (David Bromwich & George Kateb eds., Yale University Press 2003) (1859). Many formulations of it exist, of course, e.g.: Thomas Paine, Dissertations on Government; the Affairs of the Bank; and Paper Money (1786) ("despotism may be more effectually acted by many over a few than by one man over all").

[3] A number of theorems illustrate the attractive features of majority rule but show that it achieves good social outcomes only under narrow conditions. See, e.g., Howard R. Bowen, The Interpretation of Voting in the Allocation of Economic Resources, 27 Q. J. Econ. 58 (1943); Kenneth O. May, A Set of Independent Necessary and Sufficient Conditions for Simple Majority Decisions, 20 Econometrica 680 (1952); Douglas W. Rae, Decision-Rules and Individual Values in Constitutional Choice, 63 Amer. Pol. Sci. Rev. 40 (1969); Michael J. Taylor, Proof of a

But there are good reasons to be worried about tyranny of the majority. The first reason is that, as noted, majority rule, unless constrained to prevent tyranny of the majority, will not necessarily advance the public good. Majority rule can lead to the systematic transfer of wealth or resources from a minority to the majority. From the standpoint of the public interest, such systematic transfers are sometimes justified (for example, transfers from rich to poor), but they need not be, and nothing about majority rule guarantees that such transfers will promote public well-being. The transfers may go from one morally arbitrary group to another—for example, election winners to election losers, or poorer people to wealthier people, or black people to white people. Often these transfers incur substantial waste both administratively and in separating goods from the owners that most value them.[4] Moreover, because the harm from being trapped in a minority is so great, people will struggle to form coalitions that constitute a majority—a high-stakes game that consumes time and resources that could be more productively spent elsewhere.

There are actually two distinct problems here that are often merged together. In the United States, tyranny of the majority usually refers to the systematic and repeated use of the political process by a relatively stable majority (such as white people) to pass legislation that benefits it at the expense of a "discrete and insular" minority (such as black people).[5] It is sometimes thought that majority rule is less troublesome when groups "take turns" playing a role in the majority. For example, if whites and Latinos outvote African-Americans on a bill proposed this year, but then African-Americans have a chance to form a coalition with Latinos to outvote whites next year, and so on, one might believe that "tyranny of the majority" does not take place. But whatever label one uses, majority rule is still not optimal. The reason is that if the white-Latino coalition inefficiently expropriates from African-Americans in year 1 by using inefficient legislation that reduces public welfare, and the black-Latino coalition does the

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Theorem on Majority Rule, 14 Beh. Sci. 228 (1969); Ted C. Bergstrom, When Does Majority Rule Supply Public Goods Efficiently?, 81 Scand. J. of Econ. 216 (1979). The large literature on voting rules is surveyed in Dennis C. Mueller, Public Choice III (2003); Kenneth A. Shepsle, Analyzing Politics (2d. ed. 2010); and other volumes. Lurking in the background is Arrow's theorem, which proves that under relatively broad conditions, no voting system can produce outcomes that are both Pareto-efficient and non-dictatorial. Arrow's theorem assumes ordinal preferences; the quadratic voting system we discuss below does not.

[4] There are countless historical examples of the violent transfer of resources from a minority group to the majority; the expropriation of assets of Jewish citizens by the Nazi government in Germany is the canonical example, See Constance Harris, The Way Jews Lived: Five Hundred Years of Printed Words and Images 328 (2009).

[5] See, e.g., Lani Guinier, The Tyranny of the Majority (1994).

same in year 2, and so on, then majority rule makes possible legislation that causes social harm even if it is spread out among all groups rather than concentrated in a single group—social harm that the political process should avoid if possible. When we use the term "tyranny of the majority," we mean to refer to this broader problem with majority rule systems, and not just to the first case.[6]

The second reason for being worried about tyranny of the majority is that majority rule can short-circuit democracy. If democracy means that members of the public play a role in governance, majority rule can subvert democracy by excluding even large minorities from self-governance. The majority can entrench itself by throwing up hurdles to political participation by minorities—gerrymandering districts, imposing censorship, raising the cost of political organization, even disenfranchising the minority. In these ways, temporary electoral successes can lead to a permanent weakening of democratic institutions. Recently, tyranny of the majority was the rallying cry of liberal groups in Egypt during the administration of President Mohamed Morsi before he was overthrown by the Egyptian army; in Turkey under President Recep Erdoğan; and in Russia under President Vladimir Putin. In Turkey and Russia, minorities protested but made no headway; in Egypt, they repudiated democracy because Egyptian democratic institutions did not protect them.[7]

For these reasons, both philosophers and practical politicians have sought limits on majority rule so as to minimize or eliminate its negative consequences. For the purpose of this paper, we will ignore one extreme—autocracy or dictatorship—which has the obvious defect that it enables the ruler to exploit the

[6] For example, suppose that proposed government projects routinely produce 100 for A, 100 for B, and -300 for C. Even if over time, different people or groups take turns playing the role of A or B or C, a system of majority rule that approved all of these projects would gradually impoverish everyone even if it did not single out any particular individuals or groups for particularly burdensome treatment. The legal literature on judicial review (discussed below) largely ignores this problem, and focuses instead on settings where the same group always is forced to take the role of C.

[7] See Michael Kelley, Egypt Is Falling Apart On The Anniversary Of The Revolution, Bus. Insider (Jan. 25, 2013, 12:52 PM), http://www.businessinsider.com/egypt-on-the-anniversary-of-its-revolution-2013-1; E.J. Dionne, Obama Embraces Democratic Realism Abroad, CHI. TRIB. (Dec. 13, 2011) http://articles.chicagotribune.com/2011-12-13/news/ct-oped-1213-dionne-20111213_1_human-rights-foreign-policy-state-hillary-rodham-clinton; Laurence Norman & Joe Parkinson, Erdogan Aims to Ease EU Concerns, WALL ST. J. (Jan. 21, 2014, 4:24 PM), http://stream.wsj.com/story/latest-headlines/SS-2-63399/SS-2-431363/.

majority, and not just the minority.[8] But many other institutional arrangements are consistent with the spirit behind majority rule—the idea that the population should govern itself both because self-governance leads to good outcomes and because self-governance is required by fairness or democracy. These arrangements include supermajority rules, bicameralism and separation of powers, weighted voting, judicial review, representational democracy, and much else. Unfortunately, they all have significant problems, indeed, basically the same problem: they either give insufficient power to minorities, allowing tyranny of the majority, or they give excessive power to minorities, which leads to gridlock as well as unfair political outcomes. No existing system calibrates the power afforded to minorities to the strength of their interests in a given policy decision.

A new type of voting system, however, offers a solution. Under quadratic voting (QV), everyone votes on proposals (in the case of referenda) or candidates by buying as many votes pro or con as they want. The price they pay is the square of the number of votes they buy. The amount collected is redistributed back to the voters on a pro rata basis. As shown by one of us,[9] QV guarantees outcomes that maximize social welfare. It avoids tyranny of the majority by giving the minority the ability to buy extra votes, but because the minority must pay a price per vote proportional to the votes they purchase, it does not allow the minority to extract unfair outcomes or cause gridlock.

We realize that some readers will not take seriously a political voting system that allows people to buy votes. There is a strong taboo against vote-buying, and one may worry that such a system will benefit the rich at the expense of the poor. However, we will show that the taboo reflects the harmful effects of money in an ordinary political system, such as one-person-one-vote majority rule, and the logic of the taboo does not apply to QV. Moreover, we will show that QV would improve the equity of voting outcomes compared to the status quo.

The first part of this paper sets the stage for quadratic voting by providing a brief survey of efforts to develop voting and related mechanisms to solve the problem of tyranny of the majority, or, more specifically, ensure that governments make decisions that advance the public good rather than wastefully shift around resources among interest groups. We show how all approaches have significant difficulties, which explains why democracy remains the "worst form of

[8] However, dictatorships usually are supported by powerful minorities, which believe that they would do worse under a system of majority rule. See Daron Acemoglu & James A. Robinson, Economic Origins of Dictatorship and Democracy (2006).

[9] See E. Glen Weyl, Quadratic Vote Buying (April 1, 2013) (unpublished manuscript), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2003531.

government except all those other forms that have been tried," in Winston Churchill's words.[10] The second part of this paper explains how QV works, how it can be applied to democratic politics, and why it is superior to other voting systems.

I. The Problem of Intense Preferences in Democracy

A. Ancient Times

The earliest examples of institutionalized majority rule come from Homeric, German, and Spartan assemblies, where the group expresses its preference by acclamation, with the presiding officer declaring the outcome.[11] Rule by acclamation (rather than ballot) may have been convenient for an illiterate population (though the use of ballots does not require literacy), but an interesting, and apparently intentional, feature of it is that it permits people to express the intensity of their preferences by shouting or murmuring. An intense minority could thus outshout a waffling majority, at least as long as the minority is not too small. The aggregate level of sound in this way reflects both the number of voters and the intensity of their preferences. To be sure, people could act strategically by shouting when they did not have strong opinions, but the publicity of the act and the risk of being seen as a strategic actor may have limited the value of this option.

The purest form of democracy known to history was the Athenian democracy of the 5th century B.C. Most government power was held by the Assembly, which consisted of all (adult male) citizens regardless of their social status or property holdings. Although magistrates, boards, councils, courts and other offices and institutions existed, their power was subordinate to that of the Assembly. The Assembly could pass laws, issue decrees affecting individuals, and punish political leaders with ostracism and other sanctions, including death. Every member of the Assembly had one vote, and majority rule prevailed.

But the Athenians were well-aware of the dangers of majority rule. In one famous incident during the Peloponnesian War,[12] the Assembly tried and

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[10] Winston Churchill, 444 Parl. Deb., H.C. (5th ser.) 207 (1947).

[11] John Gilbert Heinberg, History of the Majority Principle, 20 Am. Pol. Sci. Rev. 52, 55 (1926). In Sparta, "The loudness of the cry was judged by men shut up in a house near the Apella, from which they could hear the cry, but could not see the assembly." Id. See also Melissa Schwartzberg, Counting the Many: The Origins and Limits of Supermajority Rule 21-25 (2013) (discussing acclamation systems).

[12] Xenophon, Hellencia, Book 1 (G. Bell and Sons 1897).

condemned to death a group of generals for failing to rescue survivors and recover the bodies of the dead after a naval victory off the Arginoussai islands; later, persuaded that a storm prevented the generals from acting, the Assembly condemned to death the generals' accusers.[13] The account left to us by Xenophon depicts an out-of-control mob that, manipulated by demagogues and provoked by a sympathetic survivor of the disaster, disregarded constitutional norms.

Greek thinkers often disparaged Greek democracy because the masses of poor could outvote the smaller group of educated people, and could force through wealth transfers. Plato saw democracy as lawless rule of the mob.[14] Aristotle held a more favorable view of democracy but similarly believed that because the poor form the majority, they will rule so as to advance their own interests rather than the common good. In a famous passage he suggested weighting votes by property holdings, possibly as a way for reflecting preference intensity.[15] The playwright Aristophanes satirized democratic decision-making by citing examples of the poor outvoting the rich on the raising of fleets, which the rich paid for while supplying the poor with jobs as sailors.[16] In Polybius' words,

> By its violence and contempt of law [democracy] becomes sheer mob-rule… For the mob, habituated to feed at the expense of others, and to have its hopes of livelihood in the property of its neighbor, as soon as it has got a leader sufficiently ambitious and daring, being excluded by poverty from the sweets of civil honors, produces a reign of mere violence. Then come tumultuous assemblies, massacres, banishments, [and] redivisions of land….[17]

After their defeat in the Peloponnesian War, which was blamed in part on the poor decisions of the majority, Athenians introduced a more moderate form of democracy. They gave more power to independent bodies, including a commission that proposed legislation (the Nomothetai), and a People's Court, which had the power to strike down decrees of the Assembly that violated the laws. Since the members of all these bodies were selected by lot, the practical effect was to require multiple majority votes involving different groups of people,

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[13] Mogens Herman Hansen, The Athenian Democracy in the Age of Demosthenes 6 (J.A. Crook trans., University of Oklahoma Press 1999).

[14] Plato, The Apology 31-32, and Plato, The Republic 473, in Plato: The Collected Dialogues (Edith Hamilton & Huntington Cairns eds. & Hugh Tredennick trans., 1987).

[15] See Aristotle, Politics, Book 6, Part III (Benjamin Jowett trans., Paul Negri & John Berseth eds., 2000).

[16] Hansen, supra note at 8.

[17] Polybius, The Histories, Perseus Digital Library, http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.01.0234.

which amounted to an implicit supermajority requirement (except in rare cases where the median voter in both bodies had the same political preference). Members of the Court were required to be over thirty years old, unlike members of the Assembly, and were required to take oaths to uphold the law; these requirements would also have ensured that the bodies differed in ideological composition. Other procedural innovations—like requiring the Assembly to hold two meetings for approval of treaties and other decrees—also weakened the hand of the majority by forcing it to sustain itself over a period of time.[18] Yet these procedures also led to gridlock, the great risk of supermajority rule, as we will discuss shortly.[19]

Another way to protect the interests of the minority in a majority-rule system is to give power to the agenda-setter or presiding officer. In ancient Athens and especially Rome, magistrates could sometimes thwart the will of the majority, especially when the majority was subject to a fleeting passion, by announcing that the gods disapproved of the voting date, or by manipulating the order of the voting.[20] Both polities also gave discretion to magistrates, and they could use that discretion to advance the common good when their activities could not be observed and checked by the people. But giving discretion to government officials creates a new problem, which is that they use their powers to advance their own personal interests, or the interests of favored families, clans, or other groups.

The more significant development was the theory of the mixed constitution, which was famously advocated by Polybius.[21] A mixed constitution is one in which different social groups—typically, the masses, the aristocracy, and a hereditary ruler—are given influence over governance. The mixed constitution ensured that any group could veto political outcomes that it disapproved of. In the Roman Republic, for example, the Senate was dominated by aristocrats, while certain important offices were reserved for plebeians. Assemblies gave ordinary people a voice by virtue of their number, but electoral procedures gave advantages to voters with greater wealth.[22]

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[18] Hansen, supra note, at 307.
[19] Id. at 308.
[20] See J.A. North, Democratic Politics in Republican Rome 126 Past & Present 3, 17 (1990), available at http://www.jstor.org/stable/650807 ("Above all, they exercised an exclusive control as magistrates, senators and priests over the ceremonial of public religious activity, and hence over access to the gods and to divine legitimation of all human activities.").
[21] Polybius, supra note; see also Aristotle, Politics, Book 3 (Benjamin Jowett trans., Paul Negri & John Berseth eds., 2000).
[22] Polybius, supra note.

The Roman Republic lasted centuries, and was a spectacular success by the standards of the time. Its mixed system effectively created supermajority rule that ensured that ordinary people could influence government policy but not expropriate the property of smaller groups, including the wealthy, which limited conflict and civil war for many centuries.[23] But the large number of veto points led to gridlock, which powerful rulers from time to time resolved with extra-constitutional acts, leading eventually to civil war, dictatorship, and then empire.[24]

B. The Modern Period

1. The Attractions of Supermajority Rule

The next step in the development of voting systems took place in Italian communes in the Middle Ages. These communes used supermajority rules to elect their leaders—sometimes unanimity, but usually 2/3 or some other fraction considerably larger than the majority.[25] In the Church, canon law provided that many decisions would be made by majority rule, but a complicated set of laws permitted outvoted minorities to appeal to higher officials and prevail if they could persuade those officials that the majority vote was contaminated in some way—by the personal interests or motives of voters in the majority, or simply because it was wrong.[26] Under the doctrine of *maior et sanior pars*, a minority could outvote a majority if the minority contained people with superior judgment, such as those with greater experience and wisdom—a form of weighted voting that we will discuss later.[27] In England, the House of Commons began to use majority rule in the fifteenth century, but Great Britain had a classic mixed Constitution—with the aristocracy able to exert power through the House of Lords, and the King able to act on his own—so that in practice political outcomes must have satisfied an implicit supermajority rule (putting aside Cromwell's dictatorship).

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[23] See Schwartzberg, supra note, at 39-46.

[24] See Eric A. Posner, The Constitution of the Roman Republic: A Political Economy Perspective (U of Chicago Law & Economics, Olin Working Paper No. 540; U of Chicago, Public Law & Legal Theory Working Paper No. 327), available at http://ssrn.com/abstract=1701981.

[25] Heinberg, supra note at 58; Arthur M. Wolfson, The Ballot and Other Forms of Voting in Italian Communes, 5 Am. Hist. Rev. 3 (1899). Supermajorities rules also existed in ancient times—and effectively in Rome as note above—but become more explicit in this period. See Schwartzberg, supra note, at 44-46, 49-51.

[26] Heinberg, supra note at 59-60.

[27] John Gilbert Heinberg, Theories of Majority Rule, 26 Am. Pol. Sci. Rev. 452, 456 (1932); Schwartzberg, supra note, at 52-58.

What accounted for the growing popularity of supermajority rule? A plausible answer is that supermajority rule allows the majority to govern while giving some protection to people with intense interests when they are unable to form a majority coalition. Supermajority rules protect minorities, and thus they enable people with intense preferences to block acts that harm them if they form a large enough minority or can form a large enough minority coalition with other interests. Supermajority rule may thus seem like an improvement over majority rule.[28] One can thus speculate that supermajority rules appealed to political leaders, constitutional founders, and the general public for two reasons. First, people in the majority today know that they may be in the minority tomorrow. They give up the chance of prevailing by a weak majority in return for gaining the ability to block weak majorities—a tradeoff that may reduce the risk of purely redistributive but inefficient outcomes that favor one group sometimes and another group at other times, thus giving no one a net gain, while reducing total wealth over time. Second, people with intense preferences who repeatedly are victimized in the political process have strong incentives to rebel or secede; supermajority rule institutionalizes their power so that it flows through peaceful political channels.[29]

Stronger rules—like rule by unanimity or consensus—also can block tyranny of the majority, but they suffer from a significant disadvantage: they cause gridlock. The advantage of unanimity rule is that projects are possible only if they benefit all members of the group. The disadvantage is that any individual can hold out, preventing a project from being approved unless she receives a payoff from other members of the group. Since other individuals face the same incentives, everyone can hold out, resulting in impasse and failure.[30] This is why unanimity rule is rarely used in political groups. When it is used, it supports only the thinnest forms of cooperation. International institutions frequently use unanimity rule or variations of it. Action by the Security Council requires unanimity among the five permanent members. The Law of the Sea Authority also uses supermajority rule and vetoes to protect the largest countries.[31] Because of mutual suspicion between governments, the risk of decisions that benefit some states at the expense of others is considered intolerable. This risk is minimized

[28] See John O. McGinnis & Michael B. Rappaport, Our Supermajoritarian Constitution, 80 Tex. L. Rev. 703 (2002) who build a constitutional theory around the ideal of supermajority rule.

[29] Supermajority rule developed in certain contexts where it favored those in power (at least, relative to majority rule). See Schwartzberg, supra note, at 59-70. The bias toward the status quo would clearly benefit those who did well in the status quo.

[30] See George J. Mailath & Andrew Postlewaite, Asymmetric Information Bargaining Problems with Many Agents, 57 Rev. Econ. Stud. 351 (1990) for a formalization of this argument.

[31] See Eric A. Posner & Alan O. Sykes, Voting Rules in International Institutions, Chicago J. Inter'l L. (forthcoming 2014).

with strong decision rules that also cause gridlock, which is considered a reasonable price to pay.[32]

Hold-out is more difficult under supermajority rule than under unanimity rule, but supermajority rule is more cumbersome than majority rule, as experience in the U.S. senate shows. The series of recent crises over the debt ceiling show the hold-out power created even by relatively weak minority protections, which enable a determined minority to block projects supported by the majority even when these projects are clearly in the public interest. Furthermore, supermajority rules do not prevent a "conservative" tyranny of the majority in which legislation bringing great benefits to a minority (such as civil rights laws for racial or ethnic minorities, or same-sex marriage for gays and lesbians) is blocked by a majority. Indeed, supermajority rules discourage minorities from forming coalitions with each other to advance their interests by raising the size of the coalition needed to pass new legislation. Still, supermajority rule may be a tolerable compromise—reducing the worst excesses of tyranny of the majority without shutting down government altogether.[33]

Supermajority rule takes many forms. Sometimes, it is explicit; sometimes, other voting rules effectively require a supermajority. It can stand alone or it can be joined with still other rules that protect particular interests. The U.S. Constitution, drafted by men who were intensely aware of the history of democratic institutions and their problems, contains numerous examples of supermajority rules. A supermajority of the Senate—two-thirds—must approve a treaty before a president can ratify it. A supermajority of the Senate is needed to block a filibuster. Two thirds of each house are necessary to overcome the president's veto. These are all explicit examples of supermajority rule.[34] It is commonly said that one of the purposes of the constitutional drafters was to protect minorities—for example, the minority of Americans living in the South, or in rural areas, or creditors, or those with substantial property holdings. A better way of putting this point is that the founders realized that these groups had intense

[32] Majority rule exists in bodies like the General Assembly and the UN Human Rights Council, which lack the authority to make law, and international judicial bodies, which generally gain jurisdiction only with the consent of affected states. See id.

[33] See James M. Buchanan & Gordon Tullock, The Calculus of Consent: Logical Foundations of Constitutional Democracy (1962). But see Anthony J. McGann, The Tyranny of the Supermajority: How Majority Rule Protects Minorities, 16 J. Theoretical Pol. 53 (2004) (arguing that supermajority rule provides less protection to minorities than majority rule does because it makes it difficult for minorities to form coalitions with other minorities to advance their interests through new legislation).

[34] John O. McGinnis & Michael B. Rappaport, Originalism and the Good Constitution (2013) (describing supermajority rules in the Constitution).

interests but because they were minorities, could not depend on majority rule to protect them. Supermajority rule was thus necessary to provide such protection because a constitutional order would not survive without the support of these groups.

Another example is bicameralism. At first sight, the requirement of a majority in both houses in order to pass a bill may seem like a (double) example of majority rule rather than supermajority rule. But a simple majority in the House and a simple majority in the Senate will normally be possible only if a supermajority of Americans approve the policy. The reason is that different groups of people elect representatives and senators. Except under unusual conditions, the median voter of one group and the median voter of another group will be different, which means that a supermajority of one group or the other will be necessary to approve the bill.[35] And then because the president can veto a bill, and courts can strike it down, the U.S. Constitution builds in additional points where minorities may be able to block legislation—if the minority manages to elect the president (which is difficult but not impossible) or exerts influence over the judiciary or elements of it (which can occur when a long dominant party that has made many judicial appointments finally loses power). And then again the federal system can protect a national minority that dominates a state from legislation that the national government might like to impose on the state but cannot because authority to legislate for that policy area lies with the state. Today, a temporary political majority—even one that captures the presidency and both houses—must contend not only with the courts, but also with an entrenched bureaucracy, which can block popular legislation that it disapproves of, or water down its effect.[36] Even dictatorship, oligarchy, and aristocracy can be systems designed to protect minority interests. Oligarchy classically protects the interests of the wealthy minority; aristocracy protects the interests of ancient families or other groups with historical privileges. Dictatorships often rest on the support of powerful minorities that fear rule of the majority—for example, the Sunnis in Iraq under Saddam Hussein (where the majority consists of Shiites), and the Christians and Alawites in Syria under Hafez and Bashar al-Assad (where the majority consists of Sunnis).

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[35] See John J. Coleman, Unified Government, Divided Government, and Party Responsiveness, 93 Amer. Pol. Sci. Rev. 821 (1999).

[36] Various other rules, some in the Constitution, others customary, protect minority interests. An interesting class of such rules are "submajority" voting rules, which give minorities extra power to protect themselves by giving them some control over the agenda. See Adrian Vermeule, Mechanisms of Democracy 85-115 (2007).

Constitutional systems can also protect minority interests by giving them more votes. The U.S. Constitution did just that by giving slave-holding states extra representation in the House based on the number of slaves in their populations—the notorious 3/5 rule.[37] This rule protected states with intense minority interests (in the preservation of slavery) from the weaker interests (in the abolition of slavery) of a majority of states. The rule that states elect two senators regardless of the size of their population can also be understood as one that gives greater voting power to people in low-population states, thus again protecting intense minority interests. Similar rules can be found in corporate governance today. Shareholders with larger stakes in a corporation have more votes than shareholders with smaller stakes—voting is typically based on number of shares owned rather than status as a shareholder. Voting systems in international organizations like the World Bank and the International Monetary Fund also give more weight to countries that contribute the most money to those organizations, thus protecting their contributions from expropriation by the poorer countries that form the majority of their membership.[38]

John Stuart Mill argued that educated people should be given more votes than uneducated people because educated people understand the public good better than uneducated people do.[39] Others have advocated property qualifications over the years based on similar reasoning: people with property have more at stake in political choices, and therefore should have greater voting power.[40]

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[37] Or, looked at differently, it gives greater weight to northern states given that 2/5 of the slave population in southern states were not counted. In other words, if the baseline is that the South should have voting power in the national government that is commensurate to its fraction of the *total* national population, the rule gives extra voting power to the North; if the baseline is that the South should have voting power in the national government that is commensurate to its fraction of the national *voting* population (thus excluding slaves), the rule gives extra voting power to the South.

[38] Yet another example is consociationalism, a constitutional form where different groups (for example, different religious or ethnic groups) are guaranteed proportional representation in government, including in the executive, and decisions are usually made by consensus. Examples include Lebanon and Bosnia and Herzegovina. John Calhoun advocated a type of consociationalism when he argued that the United States should have a dual executive consisting of a Northern and Southern representative. See Arend Lijphart, Consociational Democracy, 21 World Pol. 207 (1969).

[39] See John Stuart Mill, Thoughts on Parliamentary Reform (1859), reprinted in The Collected Works of John Stuart Mill, 19 (John M. Robson ed., 1977). In common with modern approaches as well as empirical evidence, we assume that people vote in their self-interest, and hence the voting system must be designed so as to aggregate information and preferences. However, strong empirical evidence suggests that the educated typically have more intense information and preferences and thus might optimally receive, on average, a greater weight. See Raymond E. Wolfinger & Steven J. Rosenstone, Who Votes? (1980).

[40] Property qualifications for voting were common in the states at the time of the founding.

Similar reasoning justified the denial of the franchise to women, who were thought to lack the judgment to make political decisions and were otherwise protected by the votes of their fathers or husbands, and to the inhabitants of colonies, who were believed incapable of self-government because they lacked intelligence or proper traditions. In all these cases, the fear was that the a virtuous or wise minority with strong interests would be outvoted by ordinary people who, more numerous than the elites, would have greater voting power under unweighted majority rule.

Weighted voting is rarely used today in political decisions. The older justifications are now seen as biased, bigoted, and plain wrong. But, even putting aside the questionable empirical assumptions of their proponents, weighted voting is not a good way for protecting minority interests.[41] The problem is that people with extra votes can use those votes to advance their interests even when those interests are weak and they are affected less by a policy than others. The problem is familiar in corporate governance: people who own multiple shares of a corporation and therefore enjoy commensurate voting power that they can use to protect their interests, can also use this same voting power to expropriate value from other shareholders.[42] For example, a person who owns 51 percent of a corporation can in theory push through a merger that benefits her because she owns the target company and can insist on an above-market price, in the process harming the owners of the other 49 percent. The courts try to deter this kind of expropriation by giving minorities the right to challenge the merger in court and obtain a fair valuation.[43] But then judges must determine the value of the corporation—a hard thing to do, and in tension with the idea that corporations should be private in the first place.

Moreover, all major democratic systems are representative democracies, not popular democracies, and representative democracy protects minority interests to a greater extent than popular democracy does. Representatives may themselves understand the dangers of acceding to majority interests too easily; they may also be more responsive to well-organized minorities, which can contribute cash, than to the majority, which may have difficulty coordinating and enforcing its interests. The founders gave senators six-year terms in order to insulate them from public opinion and enable them to check the more democratically sensitive House.

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[41] As advocated by Iris Marion Young, Justice and the Politics of Difference (1990) (arguing that women should have a veto over issues that affect them).

[42] See Eric A. Posner & E. Glen Weyl, Quadratic Voting as Efficient Corporate Governance, U. Chicago L. Rev. (forthcoming 2014).

[43] See Reis v. Hazelett Strip-Casting Corp., 28 A.3d 442 (Del. Ch. 2011) (holding that a corporation "must pay 'in cash' an amount equal to the 'fair value' of the fractional interests.").

The framers of the U.S. constitution recognized the dangers of majority rule. During the period of the Articles of Confederation, state governments broke contracts, redistributed wealth, and engaged in other policies that benefited the majority at the expense of the propertied minority.[44] Aware also of the repeated attempts by Roman political leaders like the Gracchi and Caesar to obtain power by promising to redistribute wealth to the masses, the framers implemented numerous anti-majoritarian rules in the Constitution. These included several mentioned above: the separation of government powers into three branches that exercised partial vetoes and drew their power from different constituencies; the further division of the legislature into an upper and lower house; numerous provisions for the indirect election of powerful figures including the president and senators; the appointment of others, such as judges; explicit supermajority voting rules; federalism; extreme supermajority rules for amending the Constitution; and so on.[45] These rules did not just protect propertied interests from majority rule. They also protected sectional interests—particularly, those of merchants and slave owners.

Some commentators celebrate this system of supermajoritarianism,[46] but there is very little reason to believe that it is optimal or even close to optimal. For one thing, even if rule by supermajority is superior to rule by majority, the range of supermajority rules between majority and unanimity is infinite; no one has any idea whether the optimal supermajority rule is 51 percent or 99 percent or anywhere in between—and the optimal rule could vary for different areas of policy, and over time in response to demographic changes.[47] And then it is possible (if decision costs and hence the risk of gridlock is high enough) that pure majority rule, or even submajority rule, is better than supermajority rule. Whatever the merits of supermajority rule, it is clearly a very crude way to protect minority interests since a particular minority may not have enough votes even under supermajority rule to block adverse legislation, while another minority may have enough votes to block legislation that benefits the public interest and does not harm the minority or does so very little.[48] A minority of 32 percent cannot

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[44] See, e.g., Calvin H. Johnson, Righteous Anger at the Wicked States: The Meaning of the Founders' Constitution (2005); Jack N. Rakove, The Beginnings of National Politics: An Interpretive History of the Continental Congress (1979); and Woody Holton, Unruly Americans and the Origins of the Constitution (2007).

[45] See Daryl J. Levinson, Rights and Votes, 121 Yale L.J. 1286, 1293-97 (2012).

[46] Notably, McGinnis & Rappaport, supra note.

[47] Rosalind Dixon & Richard Holden, Constitutional Amendment Rules: The Denominator Problem, in Comparative Constitutional Design (Tom Ginsburg ed., 2012).

[48] See McGann, supra note (arguing that supermajority rule can hurt minorities by raising the costs of forming coalitions with other minorities in order to overturn laws passed by majorities).

protect itself under a 2/3 rule, and a minority of 34 percent can threaten to block legislation that benefits the public unless given a payoff.

Thus, for all its popularity, supermajority rule is fundamentally flawed. It protects intense minority interests only when those interests are held by enough people to form a blocking minority. It enables minorities with *weak* (or strong) interests to block laws that benefit the majority more than it harms the minority—creating gridlock. And it does not help people with strong interests when the status quo harms them; indeed, it hurts them by making it more difficult for them to cobble together a large enough majority with other groups in order to change the status quo.

All of these problems influenced the development of American constitutional law. In response to the problem of gridlock, over a long period the U.S. constitutional system adjusted itself by shifting power away from the states, and to the national government; and, within the national government, away from Congress and to a large bureaucracy controlled by the executive.[49] Gridlock nonetheless remains a significant problem today.

The problem of the status quo harming minorities with intense interests created even greater difficulties. Racial, ethnic, and religious minorities both suffered from discrimination in day-to-day life, and could not obtain legislative relief because they were outvoted; in many cases, particularly that of African-Americans, voters in the majority at the state level supported laws that weakened or eliminated the franchise of the minority. When African-Americans finally joined with northern whites to form majority coalitions at the national level in the 1940s and 1950s, supermajority rules protected the rights of another minority—southern whites—at their expense, as southern senators used the filibuster to defeat civil rights legislation that enjoyed majority support among the public.[50] Supermajority rules in this case entrenched a conservative minority, blocking reforms that would tremendously benefit a smaller minority.

2. Judicial Review of Legislation

In the second half of the twentieth century, federal courts stepped in to rectify the problem of tyrannical conservative majorities (or large minorities) by recognizing the rights of minorities to effective political representation. This

[49] See Eric A. Posner & Adrian Vermeule, The Executive Unbound: After the Madisonian Republic (2010) (discussing the rise of executive power).
[50] Robert A. Caro, The Years of Lyndon Johnson: The Passage of Power (2012) (describing the battles over civil rights legislation).

would turn out to be the greatest contribution of American legal and political thought to the problems of majority rule. Of course, the original constitution used the language of rights, but the constitution was not oriented toward the problem of minority racial and ethnic groups, and even if religious rights appeared in the first amendment, it was not clearly understood from the beginning that the courts would have a strong role in preventing the majority from passing laws that harm minority religious groups. Today, judicial enforcement of the political rights of politically vulnerable minorities is taken for granted.

The doctrine that courts developed for this purpose is complex; a simplified description will be adequate here. Laws are presumptively enforceable because they reflect the will of the majority. But if they burden historically vulnerable minority groups (or "suspect classes," an ill-defined concept that at least includes racial and ethnic groups), then a court will strike them down unless the government can provide a strong and persuasive reason that the burden is justified by the public gains.[51] In practice, courts approve such laws only if they are designed to benefit rather than harm the minority group (affirmative action)[52] or (in the case of religious groups) do not target minority religious practices.[53]

This approach is firmly entrenched in American legal thought, with disputes only along the margins. A small literature objects that the preoccupation with rights distorts political discourse, but it has exerted little influence.[54] Longstanding worries that judicial review interferes with democratic values, blocks publicly beneficial legislation, and can lead to backlash, have never gained a foothold.[55] Conservatives and Republicans originally opposed the extension of judicially enforced rights to minorities in the 1950s and 1960s, but today accept the principle that laws with racial classifications are unconstitutional.

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[51] See, e.g., City of Cleburne, Tex. v. Cleburne Living Ctr., 473 U.S. 432, 450 (1985) (finding that permit requirements for a mentally ill nursing home rested on an "irrational prejudice" against residents).

[52] Regents of Univ. of Cal. v. Bakke, 438 U.S. 265 (1978) (holding the special admission program constitutional for benefitting those based on race).

[53] Employment Div. v. Smith, 494 U.S. 872 (1990) (holding the state may deny unemployment compensation to those who use peyote for religious reasons when the law does not attempt to regulate freedom of religion).

[54] See, e.g., Mary Ann Glendon, Rights Talk: The Impoverishment of Political Discourse 1-17 (1991). For a discussion and criticism of this view, see Stephen Holmes & Cass R. Sunstein, The Cost of Rights 158-61 (1999).

[55] See, e.g., Jeremey Waldron, Law and Disagreement (1999); Adrian Vermeule, Law and the Limits of Reason (2008).

We can see the problems with judicially enforceable rights anew by considering them from the perspective of the problems with majority rule. Recall that the major advantage of majority rule is that it facilitates laws and other public projects that advance the well-being of most of the public (reflected by the interest of the median voter) by minimizing bargaining costs (relative to supermajority rule or rule by unanimity or consensus). But the disadvantage is that it permits majorities to expropriate from minorities, and forces all groups to expend resources in struggles to avoid exclusion from the majority coalition. At first sight, judicially enforceable rights seem like an ideal solution. They permit the majority to continue to legislate for the public good, while prohibiting them only from passing laws that harm minority interests.

But this argument is too crude. It reaches its conclusion by assuming that only two kinds of laws exist: those legitimate laws that advance the public interest without hurting the minority in any way, or perhaps only trivially; and those illegitimate laws that benefit the majority only through expropriation of minority interests. However, most laws fall between these two extremes. These laws both plausibly benefit the majority and also harm a minority.

Consider some familiar examples:

- A gang-loitering or stop-and-frisk law that reduces crime but disrupts the lives and activities of mostly minority men.
- A toughening of visa requirements that reduces illegal immigration but also disrupts cross-border relationships of immigrants and their foreign relatives and friends.
- An anti-same-sex marriage law like Proposition 8, which reinforces traditional notions of marriage supported by most Americans but that deprives gays and lesbians of advantages enjoyed by opposite-sex couples.
- Sanitation and anti-drug laws that interfere with religious rituals of minority religious groups.
- Money-tracing laws that restrict money-laundering and terrorist financing but burden Americans of Arab descent that do business in the Middle East.
- Voter identification laws that reduce voting fraud and enhance confidence in elections but deter voting among the poor.
- Zoning laws that enhance public spaces and increase property values but drive out a small number of low-income residents who cannot afford higher rents.
- Reduction of public funding for inner-city projects (mainly hurting low-income African-Americans) for the benefit of taxpayers generally.

- Eminent domain projects where a city forces the sale of several private properties, possibly at below value to the owners, in order to build a park or revitalize the downtown.

People hold different and often strong opinions about these laws but the laws all pose the same dilemma. A particular law helps (or plausibly helps) the majority and possibly the public at large, including even the affected minority, or certain members of it. But the law also puts a burden on the minority, a burden that may seem unfair and in some cases sufficiently egregious as to throw into question the desirability of the law in question. The question repeatedly arises, at what point do the benefits enjoyed by the majority justify the burdens imposed on the minority?

The Court's approach is plainly simplistic. Some laws do not explicitly discriminate against minorities—and might not be motivated by animus—and yet may impose a burden on minorities that is unfair or excessive. Critics of many of the laws described above make this argument. A stop-and-frisk law may make sense in theory, they say; but it puts an excessive burden on minorities.[56] And at least in theory there may be laws that explicitly burden a minority that may be publicly justified. The dissenting justices in United States v. Windsor held that view about the Defense of Marriage Act, which denied federal marriage benefits to same-sex couples who were legally married under state law.[57] Finally, laws that explicitly or implicitly discriminate against minority groups which are not suspect classes because not the subject of historical discrimination may nonetheless be highly objectionable from a social standpoint because they expropriate benefits from a group without producing equal social gain. Such laws include those that discriminate against regional interests (such as farmers or people living in small towns) or social classes, or any other group that fails to form a majority coalition—homeowners, or national-park visitors, or commuters, or parents with young children.[58]

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[56] See The New York Times, Injustices of Stop and Frisk, N.Y. TIMES (May 13. 2012), http://www.nytimes.com/2012/05/14/opinion/injustices-of-stop-and-frisk.html?_r=0.

[57] 133 S. Ct. 2675 (2013).

[58] An oddity here is that courts rarely try to determine whether a particular group holds political power on a case by case basis. For example, an ethnic or racial minority may be the majority in a city that passes an ordinance that is challenged in court, but if the law incorporates racial classifications that appear to burden that group it will be subject to strict scrutiny. See Dan M. Kahan & Tracey L. Meares, Forward: The Coming Crisis of Criminal Procedure, 86 Geo. L.J. 1153 (1998) (arguing that Supreme Court doctrine that banned overly vague laws used for crime control but capable of discriminatory enforcement should not be applied when minority groups support those laws).

The Court have struggled with these questions, and in recent years the doctrinal structure has reflected these strains. Two examples illustrate this problem well. First, in cases challenging laws that burden gays and lesbians, the Supreme Court has refused to recognize this group as a suspect class, so technically a discriminatory law is constitutional as long as it is rational, and under the conventional rules, that would almost always be the case. Yet the Court has demanded that governments provide substantial evidence that these laws advance concrete interests—in health or order, for example, rather than purely moral interests—and governments have had trouble meeting this burden. However, if the rational basis test ordinarily required persuasive social-science evidence that a law advances a particular interest, few laws would be constitutional. Social science evidence is usually extremely weak. The only really persuasive evidence comes from randomized experiments, but these are costly, rare, and difficult to generalize from. Observational studies, no matter how high their quality, are easy to criticize; and usually a consensus will come into place only after dozens have been performed. As a result, the social-science evidence that could be cited to support even laws that are widely accepted—say, imprisonment of burglars, or taxation of polluters—is weak, and when government embarks on innovative regulatory projects, the evidence will often be non-existent. Thus, if courts were to demand strong social science evidence for any law that was challenged, we would not have many laws. That is why the rational-basis test was used in the first place. The Supreme Court ended up striking down the Defense of Marriage Act because it believed that opposition to same-sex marriage reflected "animus" when in fact it reflected moral disagreement.[59] It seems likely that the real basis of the decision was the majority's view that DOMA imposed significant burdens on one group of people that were not justified by whatever advantages it might have had for others.

Affirmative action provides a second example. Affirmative action laws typically provide that African-Americans, Latinos, and certain other minority groups receive special privileges, usually the right to educational and employment opportunities that are denied to others with superior qualifications. These laws sit uneasily with the premise that rights protect minorities because the laws discriminate—more-or-less explicitly—against various minority groups, such as Asian-Americans, who are routinely denied educational slots for which they are apparently qualified. While doctrine permits facially discriminatory laws or laws with explicit racial classifications that serve a "compelling government interest," the type of social scientific evidence that courts normally require in these

[59] United States v. Windsor, 133 S. Ct. 2675 (2013) (holding that the Defense of Marriage Act was unconstitutional in part on grounds of improper animus).

circumstances fails to show that affirmative action benefits the public,[60] and as a result judicial support for affirmative action, never enthusiastic, has been waning.[61] Yet affirmative action could be easily seen as a reasonable, pragmatic policy of the sort that the government regularly experiments with, and justifiably so.

The basic divide in modern constitutional jurisprudence can be seen from the standpoint of preference intensity. The liberal justices on the Supreme Court worry about harms to the strong liberty or dignity interests of racial and ethnic minorities—African-Americans, Hispanics—and vulnerable groups, like prisoners, indigent people, political dissidents, and others on the margin of society.[62] Thus, liberal jurisprudence has centered on the Equal Protection Clause, the Due Process Clause, the Fourth Amendment, and the First Amendment.[63] The conservative justices on the Court also worry about majority exploitation—but they worry about the older type of exploitation that the founders worried about, namely, the expropriation of property. Indeed, the conservative view that rights are needed to protect property from expropriation long predates the liberal view that rights are need to protect the liberty interests of ethnic minorities and other vulnerable groups. Thus, the conservative justices have focused on strengthening the Takings Clause of the Constitution, which limits the power of the government to take property or issue regulations that reduce property values, without paying compensation.[64] They have also turned the Due Process Clause and the First Amendment to their advantage, using them to protect businesses against excessive sanctions and regulation of advertising.[65] Even the recent development of gun

[60] Richard H. Sander, A Systematic Analysis of Affirmative Action in American Law Schools, 57 Stan. L. Rev. (2004).

[61] Fisher v. Univ. of Tex., 133 S. Ct. 2411 (2013) (directing lower court to reexamine an affirmative action program).

[62] See John H. Ely, Democracy and Distrust (1980).

[63] Brown v. Bd. of Educ., 347 U.S. 483, 495 (1954) (concluding that the public education doctrine of "separate but equal" is "inherently unequal" under the Equal Protection Clause.); Roe v. Wade, 410 U.S. 113 (1973) (holding that a state criminal abortion statute that excepts only lifesaving procedures, without regard of other interests or stages of pregnancy, violates the Due Process Clause); Katz v. United States, 389 U.S. 347 (1967) (finding that a citizen talking in a public telephone booth had an entitlement to assume privacy under the Fourth Amendment); New York Times Co. v. United States, 403 U.S. 713, 719 (1971) (arguing that the vagueness of national security should not "abrogate the fundamental law embodied in the First Amendment.").

[64] Stop the Beach Renourishment, Inc. v. Fla. Dep't of Envtl. Prot., 560 U.S. 702, 715 (2010).

[65] BMW of N. Am. v. Gore, 517 U.S. 559 (1996) (finding punitive damages that attempt to deter activities both in and outside the state are excessive); Citizens United v. FEC, 558 U.S. 310 (2010) (finding that restrictions on corporate independent expenditures are invalid under the First Amendment).

rights can be seen as protection for a passionate gun-loving minorities.[66] The liberals and conservatives agree that tyranny of the majority requires a judicial response, disagreeing only on which minorities deserve protection.

This disagreement in turn derives from assumptions about whose interests are stronger. For conservatives, property owners have strong and legitimate interests in the enjoyment of their property, which is constantly being threatened by governments controlled by lower-income people who seek redistribution. For liberals, various minority groups and women have strong and legitimate interests in not being discriminated against by governments frequently beholden to majorities of white men.

Courts are in a difficult position. It is plausible that all these people care deeply about their interests, but the real question is how, in the context of specific controversies, to value interests that litigants allege are strong and are badly harmed by laws and policies. The actual extent to which people care about their property rights, or rights not to be discriminated against (for example, through excessive stopping-and-frisking) is simply unknown. That information cannot be elicited in a reliable way, and so judges must fall back on their intuitions, or social science evidence that is almost always weak and contestable.[67]

Judicial review also depends on judges being motivated to protect minorities that actually lack political power and not the majority or minorities that systematically prevail in the political process because they are well-organized and influential.[68] But there is no guarantee that judges will act in this way. Judges are appointed by the government, and in practice tend to advance the interests of whatever government that appoints them. They end up protecting minorities mainly because judges remain in power long after the coalition that supported the government that appoints them has collapsed.

Seen in this way, judicial review is just another form of supermajority rule—one where the supermajority threshold is effectively a function of political configurations from a generation earlier.[69] Minorities associated with Party X will

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[66] D.C. v. Heller, 554 U.S. 570 (2008) (holding a ban on handgun possession in the home a violation of the Second Amendment).

[67] See infra, on the controversy over contingent valuation.

[68] There are other criticisms of this approach (famously championed by John Hart Ely, Democracy and Distrust (1980)), focusing on the difficulty with determining whether a group has in fact been deprived of political power or deprived too an excessive or unfair degree. See, e.g., Laurence H. Tribe, The Puzzling Persistence of Process-Based Constitutional Theories, 89 Yale L.J. 1063 (1980); Bruce A. Ackerman, Beyond Carolene Products, 98 Harv. L. Rev. 713 (1985).

[69] Cf. Levinson, supra note.

have greater supermajoritarian protection if Party X was in power in the recent past; otherwise, they will not. The connection between judicial review and supermajoritarianism is clearer in other countries than in the United States. In most countries, legislatures can overturn high court constitutional interpretations by passing laws or engaging in other procedures that require a supermajority or compliance with rules that protect minority interests.[70] And in the United States as well as other countries, a supermajority can usually reverse constitutional holdings through the amendment process.[71] But, as we have seen, supermajority rule is a crude and unsatisfactory way of protecting minority interests.

In the United States, judicial review owes its prestige among liberals because from the 1950s to the 1970s the Supreme Court protected minorities that liberals care about and who (not coincidentally) played important political roles in the coalition that supported the Democratic Party—above all, African-Americans.[72] At that time, conservatives argued that the Supreme Court should not protect minorities but should defer to the political process.[73] Today, the prestige of the Supreme Court has risen among conservatives because it increasingly protects minorities that conservatives care about—property owners, businesses, and gun owners, among others.[74] These groups have played important roles in the Republican coalition. Meanwhile, liberals increasingly argue that the Supreme Court should be more deferential to the political process.[75] Like a pure supermajority rule, judicial review as practiced in the United States provides minorities with an instrument for protecting their interests; but unlike a pure supermajority rule, there is a temporal component to judicial review because of the lag between the appointment of judges and most of their rulings.[76]

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[70] See Tom Ginsburg, Zachary Elkins & James Melton, The Lifespan of Written Constitutions (Univ. of Cal., Berkeley Law & Economics Workshop, Paper No. 3, 2008) available at http://repositories.cdlib.org/berkeley_law_econ/Spring2008/3/.

[71] Id.

[72] Ely, supra note .

[73] Raoul Berger, Government by Judiciary: The Transformation of the Fourteenth Amendment (Harvard 1977). Robert H. Bork, The Constitution, Original Intent, and Economic Rights, 23 San Diego L Rev 823 (1986). Also see, Steven G. Calabresi & Lauren Pope, Judge Robert H. Bork and Constitutional Change: An Essay on Ollman v Evans, 80 U. Chi. L. Rev. Dialogue 155 (2013) (https://lawreview.uchicago.edu/page/judge-robert-h-bork-and-constitutional-change-essay-ollman-v-evans#5N).

[74] Richard A. Epstein, Takings: Private Property and the Power of Eminent Domain (1985).

[75] E.g., Mark Tushnet, Why the Constitution Matters (2010); Cass R. Sunstein, One Case at a Time: Judicial Minimalism on the Supreme Court (1999); Larry D. Kramer, The People Themselves: Popular Constitutionalism and Judicial Review (2005).

[76] For reasons of space, we have ignored other forms of minority protection that are common in foreign countries, including proportional representation and other power-sharing arrangements. For a brief discussion, see Levinson, supra note, at 1307-11; Sujit Choudhry, Bridging

A final point is that it should be easy to see how judicial review, if it can be properly practiced, reconciles democratic commitments and protection of minorities. The problem with democracy is not so much that majorities win. It is that majorities win when their interests are weaker than the interests of minorities.[77] If judges can value the interests of minorities and protect them only when they are stronger than the majority's interests, then striking down legislation may be inconsistent with majority rule, but it is not inconsistent with welfare-maximization or a more robust conception of democracy that is oriented toward welfare-maximization rather than the victory of the majority over a temporary or entrenched minority. To the extent that the public recognizes this, it will rationally lend its support in the long term to a court that strikes down legislation.

3. Executive Discretion and Technocracy

We should also mention a final common method for aggregating preferences in a way that takes account of those who have intense preferences. In the United States and many other countries, policies are frequently made by bureaucracies or government agencies rather than by the legislature. These agencies have considerable discretion to choose policies that advance the public good as a whole rather than specific interests, and thus to give greater weight to intense preferences, even if held by only a minority, than to weak preferences held by the majority. If they are controlled by the chief executive, and if the chief executive has strong electoral incentives to advance the public good, the agencies may be motivated to choose regulations on the basis of aggregate preferences.[78]

The problem is knowing what those preferences are. Since the 1980s, U.S. regulatory agencies have increasingly relied on cost-benefit analysis.[79] Using cost-benefit analysis, an agency evaluates a proposed regulation or project—like a pollution control regulation—by determining whether the public benefits exceed

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Comparative Politics and Comparative Constitutional Law: Constitutional Design for Divided Societies, in Constitutional Design for Divided Societies (Sujit Choudhry ed., 2008).

[77] Cf. Barry Friedman, The Will of the People (2009), who argues, in a similar spirit, that the Court retains public support by provoking debate over significant issues rather than systematically ruling against the majority.

[78] In a similar vein, prosecutorial discretion allows the executive to avoid prosecuting people who commit morals crimes—acts that society disapproves of but does not cause harm to anyone—such as sodomy, prostitution, and drug use. The tradition was to tolerate this behavior unless it was flaunted; in this way, the executive accommodated people with intense interests in the activity while otherwise enforcing the weaker preferences of the majority. On prosecutorial discretion generally, see William J. Stuntz, The Collapse of American Criminal Justice (2013).

[79] Matthew D. Adler & Eric A. Posner, New Foundations of Cost-Benefit Analysis 10-20 (2006).

the (usually) private costs. Costs can be easily determined: they are simply the financial cost of installing a scrubber or supplying workers with protective masks, plus costs attributable to lost sales if the price increases. Determining benefits is trickier. If the regulation improves the quality of air, the agency might determine benefits by calculating avoided medical costs or property damage. But often the benefits include general amenities (such as a clear rather than smoggy sky) or avoided mortality, which are intrinsically hard to value. Agencies have developed controversial methods for valuing these goods, such as contingent valuation, where they simply ask people how much they would be willing to pay for a public good.

Cost-benefit analysis addresses the problem of intense preferences by measuring them in terms of willingness-to-pay. Suppose the question is whether to impose a strict or weak pollution regulation. Asthmatics and others sensitive to pollution are willing to pay a great deal for a low level of pollution, while other people may not. The regulator aggregates the amounts that everyone is willing to pay in order to determine the correct level of strictness. Thus, even if asthmatics form a small minority, their preferences will influence the outcome by causing the regulator to choose a higher level of pollution control than it would if it chose the optimum for the majority. In this way, cost-benefit analysis improves on majority voting, which in this context would result in no (rather than moderate) pollution control.

But cost-benefit analysis suffers from numerous problems. As noted, while regulators can sometimes derive valuations from market behavior, they often cannot—precisely because government projects are used to generate public goods where markets fail. Even when market valuations can be used, they reflect the preferences of marginal, rather than average, consumers and are thus extremely sensitive to spurious factors such as the state of technology.

Given these problems, agencies often run so-called "Contingent Valuation" (CV) surveys that ask individuals to report their personal valuations for (usually public) goods.[80] Contingent valuation surveys cannot guarantee that people answer questions honestly or after thinking carefully about how public resources should be used. In fact, participants in such surveys *never* have an incentive to tell the truth unless they expect the survey to have no impact on public policy; but if this is true, why run the survey in the first place? [81] Empirical

[80] Robert C. Mitchell & Richard T. Carson, Using Surveys to Value Public Goods: The Contingent Valuation Method (1989).

[81] Richard T. Carson & Theodore Groves, Incentive and Informational Properties of Preference Questions, in The International Handbook on Non-Market Environmental Valuation (2007).

evidence indicates that in practice these surveys deliver information of little value.[82]

In addition, wealth disparities can distort the valuations elicited by cost-benefit analysis—the rich are willing to pay more for goods than the poor are, even when those goods do not make the rich better off than the poor.[83] And, finally, the executive branch of the government is not necessarily well-motivated to use cost-benefit analysis honestly. When President Reagan ordered regulators to use cost-benefit analysis in 1981, critics argued that he was trying to create bureaucratic hurdles to regulation.[84] And then when President Clinton renewed the order in the 1990s, critics argued that he did so for public relations reasons only, and that his agencies manipulated cost-benefit analysis to rationalize decisions made on political grounds.[85] The underlying problem is that cost-benefit analysis requires a certain amount of discretion and judgment. If elected officials seek to advance the interest of the majority rather than the general public, and can control the bureaucracy, then giving it discretion does not solve the problem of tyranny of the majority.

4. Summary

Concerns about majority exploitation of the minority are really concerns that people with weak preferences about an issue determine policy that harms people with strong preferences about that issue. Under majority rule with one-person-one-vote, people with strong preferences will prevail if they happen to form a majority, but if not, the policy outcome will reduce social welfare rather than increase it. If those people with strong interests systematically lose whenever a vote is held, outcomes will be deeply unfair and inequitable as well as inefficient. But even if they sometimes win and sometimes lose, social welfare will decline rather than increase over time.

As we have seen, institutional designers have developed numerous ways of solving this problem, including the use of supermajority rules, weighted voting, judicial enforcement of rights, and cost-benefit analysis. And, as we have seen, all of these approaches are deeply flawed. We now turn to a possible solution.

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[82] Peter A. Diamond & Jerry A. Hausman, Contingent Valuation: Is Some Number Better Than No Number?, 8 J. Econ. Persp. 45 (1994); Jerry Hausman, Contingent Valuation: From Dubious to Hopeless, 26 J. Econ. Persp. 43 (2012).

[83] This is also an objection to our proposal, which we discuss below.

[84] Adler & Posner, supra note.

[85] See Robert W. Hahn & Cass R. Sunstein, A New Executive Order for Improving Federal Regulation? Deeper and Wider Cost-Benefit Analysis, 150 U. Pa. L. Rev. 1489 (2002).

II. Quadratic Voting

A. The Problem

Suppose that the legitimate purpose of government is to advance the public interest, and that advancing the public interest involves the welfarist goal of generating gains for individuals. Suppose further that a public project can be legitimate even though it produces losers as well as winners (as it inevitably will) as long as the winners in aggregate gain a great deal and the losers in aggregate do not lose too much—or as long as gains and losses are fairly distributed so that over the long term everyone or nearly everyone gains on net. We don't need to be specific about how gains and losses are aggregated, and can acknowledge that large gains to the very rich may not justify small losses to the very poor.

If the key difficulty with traditional voting rules is that they do not give influence to people in proportion to the intensity of their preferences, then the solution must address this problem in particular. Political scientists and economists have proposed an enormous variety of voting systems to do just that. The basic approach of these voting systems is to allow people to cast more votes when their preferences are intense. Few of these systems have been implemented. The problem is that they are too complex for people to understand, or too vulnerable to manipulation.[86]

It is useful to begin against the backdrop of the one institution that awards goods according to the intensity of preference: the market. In the market, people have different valuations for different goods; the market, when it works well, channels goods to those who value them the most. In effect, the people who care more about certain goods can express their interests in them to a greater extent than others, and thus exert a greater influence on the ultimate allocation of goods.

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[86] The literature is complex; for a survey, see Mueller, supra note, at 147-181; Shepsle, supra note. See William Vickrey, Counterspeculation, Auctions, and Competitive Sealed Tenders, 16 J. Fin. 8 (1961); Edward H. Clarke, Multipart Pricing of Public Goods, 11 Pub. Choice 17 (1971); Theodore Groves, Incentives in Teams, 41 Econometrica 617 (1973) (the Vickrey-Clarke-Groves mechanism, which is too complex and vulnerable to collusion, and so has not been used despite its canonical status). For a recent contribution, see Rafael Hortala-Vallve, Qualitative Voting, 24 J. Theoretical Pol. 526 (2011). For criticisms of the canonical Vickrey-Clarke-Groves mechanism, see Lawrence M. Ausubel & Paul Milgrom, The Lovely but Lonley Vickrey Auction, in Combinatorial Auctions 17-40 (Peter Cramton et. al. eds., 2006); Michael H. Rothkopf, Thirteen Reasons Why the Vickrey-Clarke-Groves Process Is Not Practical, 55 Operations Research 191 (2007) (showing manipulability).

They do so, of course, by paying more money for those goods than other people do. The price system forces people to make tradeoffs—to sacrifice the power to make purchases in the future in return for the power to make purchases today—and in this way enables people to sincerely reveal the strength of their preferences in ownership of various goods, and obtain those goods that they value the most. This is the famous logic of the "invisible hand" that ensures markets provide efficient allocations, often called the Fundamental Theorems of Welfare Economics.

The market fails to provide public goods for familiar reasons—those who pay for goods cannot prevent others from free riding.[87] That is why a political system with voting rules is necessary. But the analogy from the market suggests that we could protect the interests of the minority by allowing people to buy votes, or otherwise pay money to influence the allocation of public goods.

Suppose, for example, that the government implements a vote-buying system where people pay $1 to the government for one vote on a project like the construction of a park, and people can buy and cast as many votes as they want. The government builds the park if people buy more votes for the park than against it. And if vote-buying seems improper, consider that it already takes place in corporations, where investors can increase their influence over corporations by buying shares and the votes that come with them (and even votes without shares, subject to some minimal corporate-law constraints).[88] It might seem that one can generalize: if some people pay money to the government in return for greater influence on political outcomes, and money helps fund those outcomes for the benefit of others, then the people who pay the most should have the greatest influence on outcomes.

There are two problems with this scheme. The first is that it gives the wealthy excessive influence over political outcomes. The rich can buy more votes than the poor, and even if they end up paying more for public projects, there is no guarantee that those projects will advance the public good. The second problem—and our focus—is that the proposal does not in fact give voters or vote-buyers the right incentives to cast their votes for projects that advance the public good.

To see why, consider a simple setup where the goal of the government is to maximize the well-being of the public, as measured by people's willingness to pay for public projects. A project should be approved, for example, if its backers

[87] Paul A. Samuelson, The Pure Theory of Public Expenditure, 36 Rev. Econ. Stat. 387 (1954).
[88] Henry T. C. Hu & Bernard Black, The New Vote Buying: Empty Voting and Hidden (Morphable) Ownership, 79 S. Cal. L. Rev. 811 (2006).

would be willing to pay in aggregate $100 for its implementation while its opponents would be willing to pay only $90 to block it. To evaluate projects, the government must elicit people's willingness-to-pay, which is generally private information. (It is not always entirely private information; when governments perform cost-benefit analysis, they estimate willingness-to-pay based on observed market behavior. But cost-benefit analysis has well-known limitations and there is almost always some component of private information.[89]) People have strong incentives to exaggerate their willingness-to-pay. A person willing to pay $10 for a project might as well say that she would be willing to pay $20 or $100. Thus, the government cannot elicit preferences simply by asking people what they are.

What about the vote-buying scheme? Now people must pay money, and the requirement that they pay might put limits on their ability to exercise influence over outcomes that is disproportionate to their interest in those outcomes. One might think that a person who values a project like a park at $10 would offer $10 to the government in return for 10 one-dollar votes, and a person who opposes the park might pay, say, $9 to block it. The government could aggregate the payments (which could be put into its budget) and approve the project if people buy more votes in favor of it than against it.

But people would not act this way. Most people would probably pay nothing for (or against) the park and instead free ride. A person would reason that if she buys some votes, they will not affect the outcome, especially if there are thousands of voters, while the votes cost her something. And if she reasons farther along the chain of outcomes, she might realize that others will think like her, in which case maybe no one on her side will vote, in which case she would waste money by voting. To be sure, she might realize that, based on this reasoning, no one on the other side will vote either, in which case her votes might make a difference. But it is quite unlikely that the small probability of affecting outcomes, even given the behavior of others, will give her the right incentives to buy votes.

An example will illustrate the argument. Consider two members of a large population, Pro and Con. Pro expects to gain $1000 if the government implements a project, while Con expects to lose $50 from the project. Each person can buy votes at $1 each. To determine how many votes to buy, Pro must first estimate the probability that she will be the pivotal voter, and thus will affect the outcome. She should not spend money on votes unless she can affect the outcome; otherwise, she loses without gaining anything in return. Suppose Pro estimates that for every vote she buys, she can increase the likelihood of approval of the project by one

[89] See supra.

percent—at least, for a range of votes. Thus, each vote has an expected benefit of $10. Pro will buy a lot of votes—stopping only when an additional vote increases the probability of winning by less than one percent, which would happen if and when Pro owns a large enough fraction of votes than the additional expected impact of another vote declines to a low level.

Con, by contrast, will likely buy no votes. If he, like Pro, expects that each additional vote will have a one percent impact, then the expected gain from a vote is 50 cents, while the cost is $1. Yet the government wants to know Con's preference. If there is only one Pro, but more than 20 Cons, the Cons in aggregate would be willing to pay more than Pro does. But because the Cons pay nothing, the government approves a project that reduces group welfare. In fact, game theoretical analysis under a variety of assumptions has shown that this simple voting scheme leads to the dictatorship of the single individual with the most intense preference, as illustrated in this example.[90]

Thus the vote-buying scheme we have described will not work. It does not force people to sincerely reveal their preferences, and so it will produce outcomes that do not advance social welfare. It addresses and overcomes the major problem of majority rule—that it does not enable people to exert influence in proportion to the intensity of their preferences—but only at the cost of replacing it with an even worse system, dictatorship: while it allows Pro, in a minority of one, to prevail over the many Cons when Pro's preferences are sufficiently intense, it does so even when the Cons should prevail because of their large numbers, and in other examples it would not help the minority at all. Yet the hypothetical vote-buying scheme also makes clear why conventional voting is problematic as well. Conventional voting provides no method for people to reveal the strength of their interests. One casts a single vote and can do no more.

B. Quadratic Voting

Recently, one of us proposed a variant of vote-buying that solves the problems we have been discussing.[91] Under Quadratic Voting (QV), everyone may buy as many votes as she wants, and pays for each vote, but the price she pays is the square of the number of votes that she casts. One vote costs $1, 2 votes cost $4, and so on. A project is approved if the votes in favor exceed the votes against. The money that is collected is returned to all voters on a pro rata basis.

[90] Eddie Dekel et al., Vote Buying: General Elections, 116 J. Pol. Econ. 351 (2008); Eddie Dekel et. al., Vote Buying: Legislatures and Lobbying, 4 Q. J. Pol. Sci. 103 (2009); Alessandra Casella et al., Competitive Equilibrium in Markets for Votes, 120 J. Pol. Econ. 593 (2012).
[91] Weyl, supra note.

Suppose, for example, that the government announces a proposal to build a park in the center of town. Every member of the town is given the right to vote for or against the proposal. People who live in the center of town strongly favor the park. Some of them spend $100 for 10 votes; others $81 for 9 votes or $121 for 11 votes, or even more. People who live farther from the center are less enthusiastic about the use of tax dollars for a park that they will rarely be able to visit. Some of them favor the park but only slightly; they buy 1 vote for $1 or 2 votes for $4. Others do not buy any votes at all, or spend a few dollars to oppose the park. And then there are some people who strongly object to this use of taxpayer dollars. They spend $100 for 10 votes against the park, or $144 for 12 votes, and so on. The government counts up the votes: if the proposal receives a majority of votes, it is approved. The money that is collected is then distributed back to people pro rata. For example, if 1000 people live in town, and $10,000 is collected, then everyone receives $10 back. This means that people who spend (say) $9 for 3 votes (for or against) will end up netting $1. Thus, people who oppose or support the park only slightly are fully compensated even if they lose. People who spend more money are partially compensated.

To understand why the voter should pay the square of the number of votes she paid rather than some other amount (such as the cube or some other power), consider Table 1, below, which shows the cost of voting under QV, and includes the marginal cost—the additional amount that a voter must pay to cast an additional vote.[92]

Table 1: Total and Marginal Cost of Voting Under QV

Votes	Total Cost	Marginal Cost
1	1	1
2	4	3
3	9	5
4	16	7
5	25	9
6	36	11
7	49	13
8	64	15
16	256	31
32	1024	63

[92] The marginal cost is the cost of casting *n* votes minus the cost of casting *n*-1 votes. For example, the marginal cost of casting the fifth vote is the cost of casting 5 votes (25) minus the cost of casting 4 votes (16), which equals 9.

As can be easily seen, the marginal cost of casting a vote is always (within \$1)[93] proportionate to the number of votes cast. It costs twice as much at the margin to cast 4 votes than to cast 2 votes (\$7 rather than \$3); twice as much to cast 8 votes than to cast 4 votes (\$15 rather than \$7); twice as much to cast 16 votes than to cast 8 votes (\$31 rather than \$15); and so on.

Rational agents maximize their utility by setting marginal cost equal to marginal benefit. This means that if John values being able to incrementally move the outcome in his favor twice as much as Sue values being able to incrementally move the outcome in her favor, John will pay twice as much at the margin as Sue does. For example, John buys 16 votes while Sue buys 8 votes. The exact number of votes that John and Sue buy depends on their estimates of how likely they will be pivotal voters, as explained below, so if John buys 16 votes for \$256 (16^2), this does not mean that he values the project at \$256. But it does mean that he values the project twice as much as Sue, who buys 8 votes. The government can thus determine which group of people—supporters or opponents—is willing to pay more in aggregate for the project even though it does not know how much any individual (or the group) values the project. Crucially, QV gives weigh both to numerosity and the intensity of interests. A large group of people with weak preferences might outvote a very small group of people with intense preferences, but not a somewhat larger group of people with intense preferences.

QV works best with a large number of voters: the more voters there are, the more accurately the system works. QV's efficiency relies on all voters perceiving the chance of their changing the outcome with an additional vote as the same. When the number of voters is large, such a perception is (approximately) accurate. If it is small, it is less so. With a small population, it becomes possible for people to have different perceptions about the likelihood that an additional vote will change the outcome (that is, the likelihood that there would otherwise be a tie, in which case an additional vote is pivotal). For example, in a small group that consists of a number of moderate voters on one side of an issue, and an extreme voter on the other side, the extreme voter will believe that a tie is less likely than the moderate voters will believe. The moderate voters assume that all voters are (on average) moderate and so discount the possibility that anyone is extreme, while the extreme voter knows that this is not the case because she

[93] An artifact of the numerical example, not a feature of the model. The voter gains the marginal benefit from casting a vote times the number of votes cast ($MB * v$), and pays the square of the number of votes cast (v^2). Setting marginal benefit equal to marginal cost, $v^* = MB/2$. Accordingly, the number of votes that a voter casts will be proportionate to her marginal benefit. The result is driven by the fact that the derivative of a quadratic equation is linear.

knows that she is an outlier. If the extreme voter cares more about the issue than the moderate voters in aggregate, she will buy fewer votes relative to her utility than is socially desirable and QV will suffer the same bias towards the majority that other democratic procedures entail, though in a less severe form. If the situation were reversed and the extreme voter cared less than the three others in total, a reversed failure could occur. The three voters are overconfident and expect to win easily, but the extremist knows that, because of her strong preferences and thus her willingness to buy many votes, a tie is more likely than it appears. In this case, QV could lead to dictatorship in the same manner as standard vote buying. Despite this, simulation evidence indicates that QV almost always outperforms majority rule.[94]

However, as the size of the group increases, the probability of either of these problems arising becomes small because no individual is capable of having much influence on the chance of a tie. In a large enough group, everyone has the proper incentive to buy votes in a way that reflects her honest appraisal of her likelihood of being pivotal. QV is not perfectly efficient, only approximately so, with the approximation growing more precise as the population grows larger,[95] and as the variance of the preferences of the members of the population declines. Both of these properties closely resemble those of a well-functioning market in a market economy: If markets are not thick enough, then large sellers or buyers may have market power that prevents perfect competition. Simulations indicate that groups of a few dozen will almost always produce efficient results.[96]

QV addresses the problem of varying intensities of preferences by giving those with stronger preferences a means of influencing the outcome in proportion to the strength of their preferences. They may still lose to the majority, but they will not lose to a majority with weak preferences (unless the majority is extremely large). Majorities will prevail over minorities—as they should—when the intensities of everyone's preferences are similar. But when minorities are sufficiently intense, or relatively large and intense, they can protect their interests from majority domination. Indeed, QV ensures optimal outcomes (with high probability if there are many voters) if the goal is to maximize the well-being of the group. Thus, it is superior to majority and supermajority rule or any other voting rule, which cannot, except extremely crudely, protect people with strong preferences. QV is also superior to cost-benefit analysis because cost-benefit

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[94] Steven P. Lalley and E. Glen Weyl, "Quadratic Voting," in progress; contact Glen Weyl at weyl@uchicago.edu for a draft.

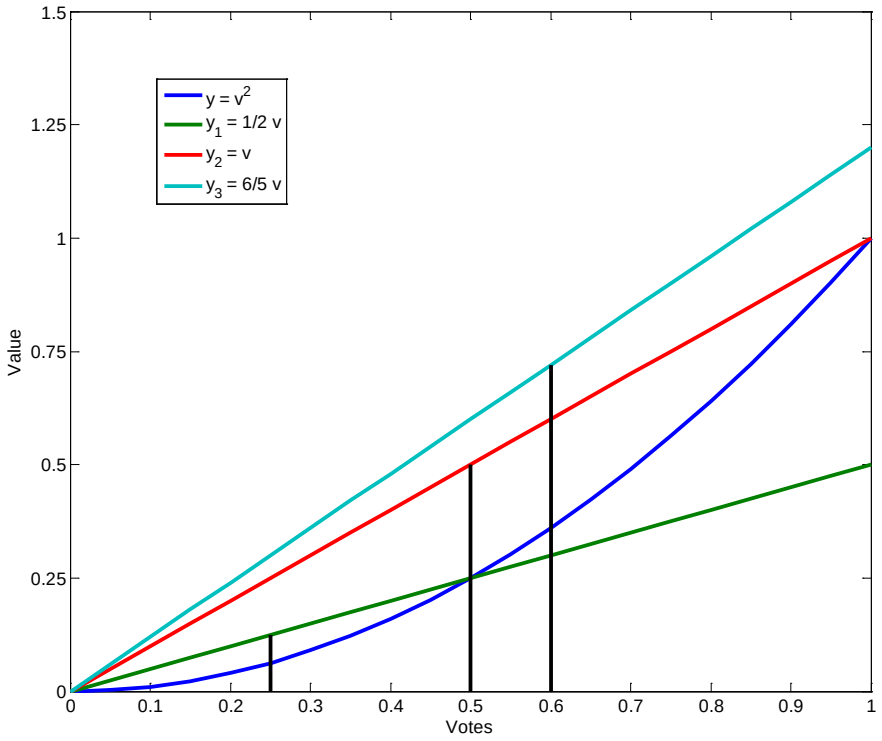
[95] At a rate of $1/\sqrt{n}$ or $1/n$, depending on the distribution of values where *n* is the population. See Weyl, supra note.

[96] See Lalley and Weyl, supra.

analysis cannot incorporate private information about the intensity of non-market preferences.

Figure 1 illustrates how QV works. The three straight lines illustrate the expected benefits that three different people obtain from a project. The lines slope upwards because the probability of prevailing increases with the number of votes one casts. In the example, person 1 obtains a marginal benefit of 1/2 from prevailing; person 2 obtains a marginal benefit of 1; and person 3 obtains a marginal benefit of 6/5. The curved line shows the quadratic cost of voting—the square of the number of votes cast. Inspection shows that each person buys a number of votes in proportion to the expected marginal benefit—person 2 buys twice as many votes as person 1, and person 3 buys 6/5 as many votes as person 2. Indeed, as noted before, they buy a number of votes equal to half of their marginal benefit. Thus, the government can, by totaling up the votes and awarding the decision to the majority, perfectly reflect the aggregation of their preferences.

Figure 1: Relative Voting Power Under QV



A further point is that because of the redistribution, the voters who lose will be at least partly compensated. Recall that under QV, the money that is paid in is returned to members of the group on a pro rata basis. This means that members of an outvoted minority will receive some money back. Those with relatively weak preferences—who therefore did not buy many votes—are likely to be fully compensated, while those with stronger preferences will be only partly compensated. While it might be better if they were fully compensated, full compensation (which would guarantee Pareto outcomes) is not practical. Moreover, partial compensation is superior to no compensation, which is the outcome under majority rule, and to excessive compensation, which is the outcome when a large minority can block desirable projects under supermajority rule, and so can demand a large transfer in return for its consent.

We can illustrate with an example. Imagine a group of 30 people, divided into three groups of ten people with identical preferences.[97] Anne (whose preferences are identical to those of everyone in the first group) obtains 1600 from a project; Bruce loses 800; and Carla loses 400. Under majority rule, Bruce and Carla would outvote Anne even though Anne's gain is greater than their combined losses. Under QV, Anne buys 8 votes in favor while Bruce buys 4 votes against and Carla buys 2 votes against—in all cases, because under QV a voter buys a number of votes equal to half her expected marginal benefit, which in this example is assumed to reflect everyone's estimate that there is a 1/100 chance of being the pivotal voter. Table 2 shows that under QV Anne would pay enough to outvote Bruce and Carla 8 to 6. The penultimate column shows how the redistribution works, and the last column shows each person's net payoff.

Table 2: An Example

Voter	Benefit	Marginal Benefit	Votes	Cost	Share	Net
Anne (10)	1600	16	8 Pro	$64	$28	$1600-64+28=$1564
Bruce (10)	-800	-8	4 Con	$16	$28	-$800-16+28= -$788
Carla (10)	-400	-4	2 Con	$4	$28	-$400-4+28= -$376
QV			8 – 6: Pro			$400
Majority Rule			2 – 1: Con			-$400

Observe that QV produces the optimal outcome because Anne (and her 9 doppelgangers) values the project more than Bruce and Carla (and their doppelgangers) disvalue it. Under majority rule, by contrast, the project is defeated. QV generates a surplus of $400 over majority rule. The sharing rule

[97] We assume 10 of each time because, as noted supra, QV works better with a large number of people than with a few. But in our discussion of the example, we focus on the three different representative agents.

reduces the variance of the outcome, though not by very much in this particular example.

C. A Real-World Example: Proposition 8

Let's now consider a real example. Proposition 8 was the California ballot initiative that banned gay marriage in 2008. Proposition 8 became law because it received majority approval, 52 percent to 48 percent of those voting.[98] Proposition 8 almost surely burdened a minority—specifically, gays and lesbians who might want to marry—more than it benefited the majority, who may have seen moral or religious positions vindicated but were not otherwise directly affected by whether same-sex marriages existed or not.

We can illustrate the argument with some back-of-the-envelope calculations.[99] Gay, lesbian, and transgender (LGBT) voters constituted about four percent of California's population in 2010, while same-sex couples constituted about 0.7 percent of households. We assume that the average same-sex couple would pay $100,000 for the right to marry, based on the fact that the average marriage ceremony costs $25,000 and LGBT couples are on average wealthier than heterosexual couples; and that single LGBT voters would pay $20,000 for the option to marry a same-sex person. This implies aggregate willingness to pay by LGBT voters to defeat Proposition 8 was $57 billion.[100] If all LGBT voters voted against Proposition 8, then among heterosexuals, the vote was 52 percent to 44 percent, implying a margin of 3,040,000 heterosexual supporters of Proposition 8. Assuming supporters and opponents have similar preference intensities, the residual supporters would have to have been willing to pay $18,750 each, assuming non-LGBT opponents were willing to pay the same amount, in order for Proposition 8 to have been welfare-maximizing. This seems most unlikely. In California, the median household income was $61,021 in 2008.[101] It is hard to believe that people who are deeply opposed to same-sex marriage would pay almost a third of their income to block it. Thus, Proposition 8 seems like a clear example of tyranny of the majority—where a majority with weak preferences prevails over a minority with strong preferences.

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[98] See Tamara Audi, Justin Scheck & Christopher Lawton, Votes for Prop 8, Wall St. J. (Nov. 5, 2008), http://online.wsj.com/news/articles/SB122586056759900673.

[99] Taken from Lalley and Weyl, supra note.

[100] 38,000,000 * 0.007 * 100,000 + 38,000,000 * 0.04 * 20,000.

[101] See U.S. Census Bureau, Median Household Income for States: 2007 and 2008 American Community Surveys (Sept., 2009), available at https://www.census.gov/prod/2009pubs/acsbr08-2.pdf.

If we assume more realistically that the marginal 8 percent of supporters would have been willing to pay on average $400 to ban same-sex marriage, while the (approximately) 4 percent of opponents would have been willing to pay on average $20,000, then the opponents would outvote the supporters under QV. Suppose, for example, that everyone thought the probability of affecting the outcome by buying a vote is one tenth of one percent. Then the supporters would buy 0.2 votes for 40 cents and the opponents would buy 10 votes for $100. The opponents would outvote the supporters even though there were only half as many opponents.

One might object that people's willingness to pay is beside the point; either there is a right to same-sex marriage or there isn't. Moreover, QV would not have blocked Proposition 8 if the gay and lesbian population were sufficiently small or supporters' preferences were sufficiently strong. This might seem unjust and wrong.

But this objection puts the cart before the horse. Rights will be recognized only if there is sufficient political or institutional support for them. Gays and lesbians do better in a QV system than in a majority or supermajority rule system because the intensity of their preferences regarding matters close to their everyday lives will exceed the intensity of the moral or ideological preferences of the average voter, and QV, unlike the other systems, allows preference intensity to affect political outcomes. Judicial enforcement of rights will protect gays and lesbians only if judges are persuaded to do so—and that will happen only if judges with the right ideological preferences are in office. In practice, judges do not protect all minorities (there is no way to do that) or even the minorities who most need protecting. They protect minorities who participated in the majority coalition that appointed the judges a generation or so earlier. So in some eras, judges appointed by Democratic presidents protect African-Americans, poor people, and other constituents of the Democratic Party—while in other eras, judges appointed by Republican presidents protect creditors, property-owners, gun owners, and other constituents of the Republican Party. If QV had been in place in 2008, Proposition 8 likely would never have passed, and so supporters of same-sex marriage would not have had to wait until 2013 for the courts to rule it unconstitutional.[102] Indeed, if QV had been in place earlier, then a ballot proposition legalizing same-sex marriage probably would have been passed before 2008.

[102] See Hollingsworth v. Perry, 133 S. Ct. 2652 (2013) (holding that petitioners lacked standing).

QV protects minorities by giving people with intense interests that are disregarded by the majority a chance to affect political outcomes, but it does not fully displace judicial review. Someone must enforce the rules of the game, and courts play that function in our society. QV would have been useless against Jim Crow because blacks in the south were disenfranchised: being disenfranchised under QV is no better than being disenfranchised under a traditional voting system, though as we discuss below QV does dramatically reduce or eliminate the incentive for such disenfranchisement. Moreover, various theories of judicial review—for example, that it is necessary to protect fundamental values—may be unaffected by our argument. But judicial review would become significantly less important if a system of QV is in place.

D. Would the Rich Exert Too Much Influence under QV?

QV offers more influence to those with greater financial resources than they could obtain under simply majority rule. The rich are willing to pay more for any given non-financial good than are the poor because money is worth less to them. One might thus worry that a society governed by QV would be inequitable. In this section, we show that from the standpoint of equity, QV is likely to be superior to one-person-one-vote majority rule.

1. Pure Transfers

One possible concern is that rich people will buy votes to support monetary transfers from poor to rich. This will not happen, however. While the rich are willing to pay more to obtain non-financial goods than are the poor, they are not willing to pay more to obtain *money*. Consider a scheme that took a dollar from every individual in the bottom 50% of the income distribution and gave $50 to every individual in the top 1%. A member of the top 1% would not pay more than $49 to enact such a proposal, which would give them 7 votes each. Such a proposal could be defeated by the bottom 50%, each buying 0.5 of a vote, which would only cost him or her a quarter each. Robbing the poor to pay the rich never prevails under QV.

QV blocks purely redistributive projects because it permits only efficient projects and redistributive projects are not efficient because they do not generate wealth. Indeed, as we will see, QV permits redistributive projects only to the extent that people care about distribution. Because wealthier people do care about the poor[103] (although maybe not enough), under QV they will support some

[103] Charlotte Cavaille & Kris-Stella Trump, Support for the Welfare State Over Time: The Two Dimensions of Redistributive Preferences, (2012) (unpublished manuscript), available at

redistribution to the poor, just as they do under majority rule. By contrast, because the poor do not—in their own minds or anyone else's—benefit by giving their money to the rich, QV would not result in redistribution to the rich.

2. Redistribution as Social Insurance

We can make this argument more rigorous by considering some theories about why redistribution exists in the first place. One influential economic view of the purpose of redistribution (or progressive taxation), first put forward by Vickrey,[104] is that taxation is a form of social insurance. Taxes and transfers blunt risks that are outside of any individual's control, thus providing her with valued insurance against bad events like sickness and job loss. The problem, however, is that taxes and transfers also blunt incentives to work and improve oneself. Thus, the optimal tax-and-transfer system balances these two factors—redistributing enough to protect people from the risk of income loss while not so much as to excessively blunt incentives to be productive.

One complication is that when people vote for tax-and-transfer schemes, they already know something about themselves—including, at least roughly, the risk that they may lose their jobs and benefit from social insurance. To understand this problem, we can consider three extreme cases. In the first, suppose people know nothing about themselves: they choose whether to support a social insurance scheme behind the veil of ignorance, before anyone makes any investments to improve their human capital or knows whether they will be lucky or unlucky in the lottery of life. In such a case, everyone would support the optimal, behind-the-veil-of-ignorance tax policy that maximizes utilitarian welfare. The reason is that a social insurance scheme is a public good—one that in this context gives everyone an insurance policy for which she would be willing to pay. This problem was studied by Mirrlees[105] and while debate rages about parameters that determine the optimal tax policy, most economists believe it involves high and progressive taxes.[106] QV would produce this outcome simply because it always chooses the welfare-maximizing result.

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http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2110010. This may be driven by altruism or fear that the poor will cause trouble unless they are paid off.

[104] See William Vickrey, Measuring Marginal Utility by Reactions to Risk, 13 Econometrica 319 (1945).

[105] J. A. Mirrlees, "An Exploration in the Theory of Optimum Income Taxation, 38 Rev. Econ. Stud. 175 (1971).

[106] Peter Diamond & Emmanuel Saez, The Case for a Progressive Tax: From Basic Research to Policy Recommendations, 25 J. Econ. Persp. 165 (2011).

In a second case, suppose that individuals are highly uncertain about their earnings but all investments that determine these earnings have already been made. In this case, there would be an extremely strong temptation to impose 100% taxation, even though, having known this beforehand, no one would have made any investment. This is a well-known time-consistency problem that can easily lead to excessive taxation of accumulated capital and most countries avoid the temptation for such taxes because they know that it will deter future investment. Democracies develop institutions like courts to reduce the risk of time-inconsistent policies; leaders also seem to understand that if they violate past commitments, they will not be trusted in the future. Thus, countries usually pay off sovereign debt so that they can borrow again. QV does not directly block time-inconsistent policies, but neither does majority or supermajority rule. But QV, unlike those other rules, does block time-inconsistent policies that are purely redistributive to the majority (or supermajority).

In a third case, opposite to the second, one can imagine the case where no investments have yet been made but everyone knows exactly the realization of the factors outside of their control that determine their destiny. In this case, insurance has no value to any individual and even though some individuals will favor higher taxes for redistribution, such taxes have no efficiency benefits. In this case, QV will favor eliminating redistributive taxation entirely.

However, this case is just as unrealistic as the second one. In reality, some investments are sunk and some uncertainty realized, but likely about roughly equal amounts of each, at least when averaged over the population. In this setting, QV would produce the optimal social insurance plan covering the residual level of uncertainty. Given the balance, it is likely the optimum would resemble that in the first case, where agents choose the social insurance system behind the veil of ignorance.

By contrast, equilibrium in such a model under one-person-one-vote majority-rule voting is indeterminate, or at least no one has ever been able to derive a determinate outcome. The problem is that any coalition of 51% of the population has an incentive to choose policies that are highly disadvantageous to the other 49% of the population. This coalition might be the bottom 51% of the distribution in terms of their current luck-accumulation and income, in which case democracy may be highly redistributive, expropriating the top 49% at the revenue-maximizing rate. This rate will not be confiscatory because beyond a point taxation is counterproductive because of reduced effort. But Saez shows that

this revenue-maximizing rate is extremely high, upwards of 80%.[107] On the other hand, if the coalition is the top 51% of the population, the incentive will be to maximize the revenue extracted from the bottom 49% and redistribute to the top 51%. That is, the outcomes yielded by majority rule are hard to predict, as many coalitions are possible. This fact is borne out by historical experience of coalitions in democracies shifting from protecting the interests of elites to attempting to redistribute from these elites.

One way to generate a more definite prediction is to restrict the policies the government can implement. The most famous such analysis is due to Meltzer and Richard.[108] They argue that a government choosing a proportional tax rate and rebating the proceeds evenly across the population will choose the tax to maximize the preferences of the individual with median income. This outcome may be more or less redistributive than the optimum that QV will implement. If the median income is quite high relative to the mean (if there is little inequality at the top end of the income distribution) but many individuals are in dire poverty, Meltzer and Richard predict that majority rule will lead to very little redistribution. However, QV would lead to strong redistribution because the risk of falling into extreme poverty would loom large enough in each individual's utility calculus to blunt the opposition of the middle class to redistribution to the poor.. If there is little poverty but significant income inequality towards the top of the distribution, then Meltzer and Richard would predict more redistribution than QV.

But such a linear tax and transfer system is only one way to implement redistribution and many, if not most, democracies do not operate that way. For example, Holland argues that in most developing countries formal state transfers do not reach the poor and instead are targeted at the middle class that works in the formal sector.[109] In such settings, democracy will experience swings (based on whether at a given time a majority is or is not covered by the formal system) between "cozy" middle class regimes that harm the poor and rich equally with high tax rates that sponsor generous pensions for the middle class, and "populist" governments that gut the state and are supported by the wealthy and the poor while being opposed by the middle class. This pattern fits the politics of many Latin American countries. QV, by contrast, will consistently yield a moderate

[107] Emmanuel Saez, Using Elasticities to Derive Optimal Income Tax Rates, 68 Rev. Econ. Studies 205 (2001).
[108] Allan H. Meltzer & Scott F. Richard, A Rational Theory of the Size of Government, 89 J. Pol. Econ. 914 (1981).
[109] Alisha C. Holland, Redistributive Politics in Truncated Welfare States (Harvard University Dep't of Government Working Paper, 2013).

level of formal benefits that trades off providing insurance to the middle classes against the costs of inefficiency and undue burdens on the poor.

Thus, majority rule is not the ally of sensible, balanced, egalitarian policies it is often made out to be. Exactly what outcomes majority rule favors is extremely sensitive to the particular coalitions that are cobbled together to form a majority. Some of these coalitions will produce outcomes that are more redistributive than is optimal, others less. Nearly all political outcomes will be unfair and inefficient. This may explain why there is huge variation across democracies in the distribution of wealth. It is simply a mistake to assume that majority with one-person-one-vote must lead to an equitable distribution. QV, by contrast, consistently favors the optimum that balances the benefits of social insurance against the deadweight loss created by excessive taxation.[110]

3. Altruism of the Rich

Redistribution of wealth may also be motivated by altruism by the wealthy or middle class, or by related concerns, for example, that inequality is a source of social instability. Under this assumption, a transfer of wealth is just a public good.[111] Because QV generates efficient outcomes, it will produce such a public good, leading to some degree of redistribution to the poor. By contrast, one-person-one-vote majority rule does not lead to efficient outcomes, as we have explained. A large minority that passionately seeks to use tax receipts to fund poor relief can easily be outvoted by a small majority that does not care about the poor or cares very little. Accordingly, along this dimension (and putting aside reasons why majority rule could lead to excessive redistribution discussed in the prior section), QV should lead to the more equitable outcome.

4. Biased Projects and Laws

One might also worry that even if QV does not produce monetary transfers from poor to rich, it will generate projects that the rich favor and the poor disfavor. For example, one might imagine that a city that uses QV would fund yachting marinas and public art rather than parks, or pot hole repair on streets in rich neighborhoods and not streets in poor neighborhoods. The rich would pay

[110] Subject to the time-consistency and partial failure of the veil-of-ignorance problems, as discussed above.

[111] See, e.g., James Andreoni, Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving
100 Econ. J. 464 (1990) (modeling altruism as a warm-glow with implications for the supply of public goods).

more for votes than the poor, and this would cause a bias in favor of public projects that the rich prefer.

However, there are several reasons for doubting that the rich would have excessive power under QV. First, the rich as a group do not have influence if they are on both sides of an issue, as they often are. And quadratic pricing minimizes the impact of large wealth disparities because the cost of buying votes increases exponentially. A rich person who sought to outvote one thousand poor people would need to spend $1 million for 1000 votes if each poor person spent $1 for one vote.

Second, while the rich exercise greater influence, they must pay for it—just as they do in the private market—and the money will end up in the pockets of the non-rich. Indeed, the very poor, who are indifferent to many public projects and therefore often do not vote, will likely do better under QV than under the current system, because the rich and middle class must, in effect, pay the poor whenever they vote. Under the current system, a poor person can exercise theoretical influence over same-sex marriage by exercising the vote but is not likely to do so; under QV that person at least receives money in return for yielding influence to others, and she can use this money to buy food and clothes. By allowing the wealthy to obtain greater influence over public goods, about which they care more, by transferring to the poor greater influence over private goods (in the sense of giving them money through the QV process which they can use to buy goods and services they need), QV would likely improve distributive justice rather than reduce it. In effect, QV gives the poor a new asset (the power to influence the allocation of public goods) that they can sell to the rich in return for money that they need more than the influence.

Many public projects—New York's Central Park, Chicago's Millennium Park—reflect the preferences of the wealthy who partly finance the projects in return for influence over them. Thus, Millennium Park contains sophisticated artwork to a far greater degree than an ordinary public park does. The poor benefit both from the public good and the fact that they don't need to pay for as much of it out of their taxes. Thus, one must remember that even under the status quo, the rich exert greater influence over public projects by financing a disproportionate share of them—an arrangement that may not be optimal or ideal but seems to be mutually beneficial. A system of QV would institutionalize this process and make it more transparent and fair.

Indeed, it is far from obvious that QV would increase the influence of the wealthy compared to the status quo, where the wealthy already have a variety of

means to buy influence through lobbying, campaign spending, and similar activities.[112] These pathways to influence would be greatly dampened by QV. The reason is that under the current system, people who want to exert influence target the swing voters—the people who don't care and thus can be moved to change their vote on the basis of relatively small expenditures on advertising. Under QV, there is no reason to target the people in the middle because those people will not buy very many votes even if they are shifted over at the margin. Influencers would use their money to target more passionate people because those people spend a lot of money on their marginal vote. Their financial interest thus may make them more susceptible to reasoned argument.

Much of government policy already reflects the influence of wealth people because of the nature of cost-benefit analysis, which is routinely used by agencies. Cost-benefit analysis is based on the willingness-to-pay of affected people, which in turn is based on their market behavior. Thus, if rich people care more about clean air than poor people, and so are willing to pay more for it, then environmental regulations will cut pollution in a way that reflects rich people's preferences more than poor people's preferences.[113] While some people believe that this is unfair, the general view is that preferences among rich and poor do not in practice vary enough to make a difference in government policy choices. If this is so, then quadratic voting would also not favor the rich over the poor.

Third, the social consequences of walling off the public sphere from efficiency is often not to make the public sphere "fairer" but to shrink it. Cities where the wealthy cannot express their willingness to pay to keep streets clean and safe and to create public infrastructure because majority rule gives them no means of doing so are plagued by what John Kenneth Galbraith in *The Affluent Society* called "the social imbalance" where people emerge from Rolls Royces

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[112] For evidence, see Martin Gilens, Inequality and Democratic Responsiveness (2005) (showing how government policy typically benefits the very well off). The problem has been exacerbated by Supreme Court decisions that have limited the power of the government to regulate campaign contributions and spending. See Buckley v. Valeo, 424 U.S. 1 (1976); Citizens United v. Federal Election Com'n, 558 U.S. 310 (2010). But the original campaign finance regulations that were struck down had only ambiguous effect. The problem is that donations have become a means for people with intense preferences to affect political outcomes, but also give an advantage to the wealthy. Thus, restricting the use of wealth has ambiguous welfare consequences. An interesting proposal to require anonymity of donations would reduce the incidence of quid pro quos but would not address the larger problem. See Bruce Ackerman & Ian Ayres, Voting with Dollars (2002).

[113] In principle, cost-benefit analysis values the lives of rich people more than the lives of poor people. W. Kip Viscusi, The Value of Risks to Life and Health, 31 J. Econ. Literature 1912 (1993). See Cass R. Sunstein, Valuing Life: A Plea for Disaggregation, 54 Duke L.J. 385 (2004), on poverty and mortality values. Note, however, that regulatory agencies use a uniform valuation.

and Trump Towers to walk along potholed streets.[114] This social imbalance leads the rich to retreat to the suburbs and to surround themselves with those similar to themselves. The social imbalance similarly leads to inaction on the international stage on global issues, like climate change and genocide. Those, often on the left, who believe in an active public sphere should not seek to defend a false egalitarianism that impoverishes the public sphere.

Finally, if one rejects all of these arguments, a version of QV can still offer significant gains even without deviating at all from egalitarian norms in elections. In a race with more than two candidates, or an election where more than a single issue is decided, individuals could be allocated an artificial currency that they could use to quadratically buy votes on individual issues. This would allow individuals to trade less influence on issues they care less about for greater influence on issues they care more about. By allowing people to express the intensity of their preferences, the process would help address many of the paradoxes and incoherencies of democracy that arise because standard voting systems do not allow people to express the intensity of their preferences.[115] In fact, greater efficiency gains could be achieved if individuals were allowed to save these tokens across elections, devoting more to elections where they cared more. Another possibility would be to reduce the influence of the wealthy by making individuals pay a quadratic fraction of their gross adjusted federal income rather than a quadratic number of dollars for influence. While both of these systems would achieve smaller efficiency gains than would QV using money, they could still greatly improve on simple majority rule.

It is important, as always, to compare QV with the existing political system or realizable variations of it, not with an unattainable ideal. In existing polities, the wealthier have more influence than the less wealthy because they can make campaign donations, take advantage of contacts, and so on. Under QV, this advantage would be both reduced and channeled more productively.

E. QV in Representative Democracy

The system of QV we have discussed so far resembles a referendum. People vote directly for a proposal by buying votes using the quadratic price. But

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[114] John Kenneth Galbraith, The Affluent Society (1st ed. 1958).

[115] See Nicolas de Condorcet Political Writings, (Steven Lukes & Nadia Urbinati eds., Cambridge University Press 2012); Kenneth J. Arrow, Social Choice and Individual Values (1951), Allan Gibbard, Manipulation of Voting Schemes: A General Result, 41 Econometrica 587 (1973); Mark Allen Satterthwaite, Strategy-proofness and Arrow's Conditions: Existence and Correspondence Theorems for Voting Procedure and Social Welfare Functions, 10 J. Econ. Theory 187 (1975).

referenda are rare in large countries, which (if they are democratic) rely on representative institutions. This raises the question how QVB would work in a representative democracy.

Voting for representatives under a system of QV could take different forms. In the interest of the space, we sketch out a possible approach but leave the details for future research. Consider a system in which voters buy votes for candidates for office by paying a quadratic price, with the money returned to voters pro rata. The QV system would operate at the level of the office—at the district level, for representatives; at the state level, for senators; and at the national level, for the president. The theory behind QV applies to representatives in the same way that it applies to projects. Under the QV system, the representative will be chosen whose expected performance maximizes the aggregate well-being of voters. Knowing this, candidates will select positions that maximize the welfare of their constituents, just as they choose positions maximizing the preferences of the median voter under majority rule.[116]

Applying QV to voting in a representative body requires an additional step. It would make little sense for legislators to put their own money at stake when voting. Instead, legislators should commit their constituents' money when they vote on bills. Suppose, for example, that a set amount of money collected through taxes is sent back to districts (and states) at the end of every year. The amount of money legislators have committed through QV during that year is subtracted from that payment. Legislators would reflect their constituents' interests faithfully so that they are reelected; and the legislators' own votes would be aggregated efficiently.

Consider, for example, a vote on whether the U.S. government should go to war with a foreign country. Legislators would vote by committing their constituents' money. If the legislators are faithful agents, passionate backers and opponents of the war would end up paying more money than people who are indifferent or close to indifferent. The redistribution of the money would blunt the impact but there would still be monetary winners and losers. Anticipating these costs and benefits, voters would elect and sanction their representatives using money from their own pockets based on QV.

Representative institutions face the same problem of preference aggregation that exists in the referendum-style votes that we discussed in the last section. Each representative represents a different group of constituents who have

[116] Anthony Downs, An Economic Theory of Democracy (1957); John O. Ledyard, The Pure Theory of Large Two-Candidate Elections, 44 Public Choice 7 (1984).

different interests. A particular bill will affect those groups in different ways—some greatly, others hardly at all. This means that representatives who seek reelection will also vary in their interests in passage of the bill. A majority of representatives who weakly oppose a bill may thus be able to outvote a minority of representatives who strongly favor it—reflecting the distribution of interests in the broader population. Thus, there is a constant danger that one-person-one-vote majority rule in representative bodies will lead to socially bad outcomes.

Representatives avoid these outcomes by logrolling: legislators are given pet projects in their districts in return for their support for national legislation. While many observers criticize such practices as corrupt,[117] it is important to remember that many landmark legislative achievements never could have been accomplished without logrolling; the recent film *Lincoln* provides the particularly poignant example of the Thirteenth Amendment, whose passage in Congress was secured through various patronage payoffs to elected officials.[118] New Deal legislation and civil rights laws would not have been passed but for logrolling.[119]

The Emergency Economic Stabilization Act of 2008, which was needed to address the financial crisis, was initially blocked in the House, and was passed only after leaders arranged for a range of payoffs, including a reduction in the depreciation schedule for improvements to restaurant buildings, extension of tax credits for solar energy installations, and tax exemptions or subsidies for film and television producers, rum producers in Puerto Rico and the Virgin Islands, racing track facilities, manufacturers of wool products, and manufacturers of toy wooden arrows.[120] Of course, logrolling is not always, or even usually efficient, and is typically done, not through direct and therefore efficient exchanges of tax payments across districts, but rather by wasteful pet projects.[121] QV would offer a more rational, efficient and fair means of allowing the incentive to "bring home the pork" to be weighed against national interests in an efficient manner. It would thus channel existing corrupt or at least unseemly, but necessary, wheel-greasing into socially efficient bargaining.

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[117] See Nicholas R. Miller, Logrolling, Vote Trading, and the Paradox of Voting: A Game-Theoretical Overview, 30 Public Choice 51 (1977). See also, Dana Milbank, Republican Lawmakers Blindsiding the Party's Conservative Base, Wash. Post (Jan. 29, 2014), http://www.washingtonpost.com/opinions/dana-milbank-republican-lawmakers-blindsiding-the-partys-conservative-base/2014/01/29/cb9bd984-8930-11e3-916e-e01534b1e132_story.html.

[118] Lincoln (DreamWorks Pictures & Participant Media 2012).

[119] See Caro, supra note.

[120] Emergency Economic Stabilization Act of 2008, 12 U.S.C.A. § 5201 (2008).

[121] See Mueller, supra note, at 104-20 (discussing literature on logrolling).

What about the risk that wealthy people will buy their way into elected office by purchasing votes for themselves? Just like today, rich people will have an advantage under QV. But while rich people under the current system can improve their electoral prospects by using personal funds to buy advertising, rich people under QV would use their funds to buy votes, with the money being redistributed to the non-rich, rather than being wasted on advertisements. Moreover, because of the square function, QV would not give even very rich people a serious advantage. An illustrative example is Silvio Berlusconi. Under QV he could, with 2.5 billion euros (roughly half of his net worth), buy 50,000 votes in a single election. That would only constitute 0.2% of the vote in the last Italian general election. On the other hand, at present Berlusconi has managed to win half a dozen elections in Italy, overwhelmingly because of the influence of his wealth. Thus, a very wealthy person, especially one very wealthy person able to dominate the media, can have far more influence through advertising than he or she could ever have through QV.

QV is a more natural fit for referenda than for representative institutions in the sense that it would require fewer far-reaching changes to how political institutions work. Thus, we make this proposal fully aware that it may seem too radical ever to be put in place and many details clearly need to be worked out. At the U.S. national level, it would require constitutional amendment; however, at local levels, experimentation is possible. Moreover, there are numerous second-best type issues that we have not addressed. The role of the presidential veto in such a system is obscure; it is probably unnecessary. QV in representative assemblies would probably make more sense in a parliamentary system than in a presidential system.

F. QV, the Franchise and Constitutional Stability

One of the major advantages of QV is that it should lead to greater constitutional stability than exists under one-person-one-vote majority rule. The latter system is famously vulnerable to constitutional manipulation. Under a majority-rule system, the majority can simply pass a law that disenfranchises the minority. Whatever majority forms initially would be tempted to do this. Democracies have developed numerous elaborate mechanisms to prevent majorities from entrenching their power. For example, judges strike down laws that disenfranchise minorities, and amendment of the Constitution typically requires a supermajority. But if the Constitution is too hard to change, then large groups of people may seek change through extra-constitutional means, and to experiment with non-democratic forms of government like dictatorship.

By contrast, under QV only laws that are efficiency-maximizing can pass. This rules out any revision that replaces QV with a less efficient form of governance. It would rule out, for example, returning from QV to majority rule, or replacing QV with an oligarchy or dictatorship. While the majority or other group might favor such a move, those opposed would oppose more strongly and those in favor more weakly, precisely by the basic efficiency logic of QV. Additionally, recall that QV is only *approximately* (with high probability) efficient and that the approximation is more accurate the less that any individual with outlier preferences opposes the efficient proposals brought forward relative to the status quo. As a result, among all efficiency-enhancing measures, QV tends to favor those that create the fewest and the least extreme losers relative to the status quo, as the only thing that can defeat an efficient law under QV is the strong opposition of an extreme opponent. Thus, QV will not replace itself with a less efficient alternative and, if it replaces itself with a (as yet undiscovered) more efficient alternative, will do so in the way that minimizes the redistribution across individuals that occurs through the transition. Because no other practical and efficient alternative to QV exists,[122] it seems highly unlikely such an efficient alternative would arise. QV is thus the maximally constitutionally stable form of governance.

One form of constitutional change, for example, to which QV is resilient is the disenfranchisement of some subset of citizens. Even more strongly, QV actually favors the enfranchisement of individuals currently outside of the polity, so long as revenues are not shared with them. The reason is that individuals included in the system will exert influence on the decision only if they are willing to make transfers to the rest of the polity that compensate the polity for the externalities created by the newly-enfranchised individual. A good analogy is again the market economy: every country benefits by opening to free trade because of the possibilities it offers to benefit from the products of other countries. Because QV, like free trade but unlike standard voting systems, is a positive rather than zero sum game, QV will encourage broadening the sphere of political inclusion rather than shrinking it.

QV is also likely to be much more resilient to extra-system revolutionary upheavals than majority rule is. Such upheavals are highly inefficient and thus any system that maximizes aggregate utility is likely to go to large lengths to avoid them. Democracies, also, go to lengths to avoid them. However, it can easily be in the interest of a narrow majority to risk such an upheaval in order to have a shot at expropriating the other 49% of the population. This has been the

[122] See Weyl, supra note.

source of many violent regime changes: Pinochet overthrew Allende for trying to use democracy to achieve radical redistribution;[123] many of Hitler's supporters voted for the Nazis because they feared the redistributive threat posed by a growing Communist party.[124] This is clearly inefficient as it converts the redistribution that democracy creates into an aggregate loss of efficiency. The prospect of such an upheaval, on the other hand, will further reinforce the tendency of QV to select, among all efficient social decisions, the one that minimizes the maximum loss any individual receives relative to the status quo. QV thus seems more likely to be stable against violent overthrow than is majority rule.

G. Other Objections to QV and Responses

The taboo against vote-buying. Vote-buying is illegal in democratic countries. Indeed, there is a taboo against it. As we are painfully aware, any suggestion that vote-buying should be legalized will be met with incredulity. However, it is important to understand the source of the taboo, and to see why it does not apply to QV.

As we explained in Part I, in a system of one-person-one-vote majority rule, such as ours, vote-buying would not improve outcomes. Instead, it would give excessive influence to people with the strongest preferences, and favor the rich. Thus, there is good reason to outlaw vote-buying in a regular system of majority rule. By contrast, the type of vote-buying that takes place in QV does produce optimal social outcomes, taking into account variations in the intensity of preferences as well as the number of people who hold particular preferences, and it does not favor the rich relative to the status quo system. In fact, under QV it would still be necessary to outlaw extra-system vote buying that could be used to undermine the quadratic nature of costs by allowing one individual to buy votes as a proxy for another.

It is useful to draw analogies to other settings in which markets are not allowed to develop. For example, there is a taboo against the sale of human organs to people who need transplants. Instead, a complicated system based on need is used.[125] But these taboos must be evaluated on their own merits. Debra Satz, for example, opposes markets in human organs because she believes that

[123] Pamela Constable & Arturo Valenzuela, A Nation of Enemies: Chile Under Pinochet (1993).
[124] See Harris, supra note.
[125] Henry Hansmann, The Economics and Ethics of Markets for Human Organs, 14 J. Health Pol. Pol'y & L. 57 (1989)

those markets harm the poor.[126] But QV should help the poor relative to the current voting system. Others believe that certain norms against buying and selling shouldn't be disturbed because they reflect important human values. But vote-buying is permitted in the corporate setting,[127] which suggests that the prohibition on vote-buying does not reflect some intrinsic moral constraint but instead advances specific institutional values that vary by context. This is, in fact, straightforward. Voting is just a procedure that takes place in a larger institutional context that enables a group to make collectively beneficial decisions. If vote-buying advances the well-being of the group, then it should be permissible.

Voting and irrationality. Many have argued that because individuals have such a tiny chance of being pivotal in elections it is irrational for individuals to vote.[128] The argument we provided for the optimality of QV depends on voter rationality. One might therefore wonder whether majority rule might not be better than QV in dealing with such irrationality.

In fact, voter irrationality is not a problem for QV as long as the irrationality is approximately uniform across individuals—more specifically, is not correlated with the utility that they gain from different laws or projects. Suppose, for example, that people generally overestimate the probability of being pivotal, or vote for reasons unrelated to the specific gains from an election such as a sense of civic duty. These factors will raise the number of votes bought by most individuals, but maintain the proportionality between vote bought and utility so long as they operate in a reasonable manner that is uncorrelated with utility. Irrationality would produce problems for QV only if (for example) people who gain more from a political outcome systematically overestimate (or underestimate) their probability of being pivotal while people who gain less from the political outcome do the opposite. As far as we know, there is no evidence for such patterns.

In fact, under almost all of the standard models political scientists use to explain voter turnout, QV actually performs better when voters are not perfectly rational than when they are. The approximate efficiency of QV becomes even more accurate as more voters participate. Recall that the only way QV can lead to an inefficient outcome is that a very extreme individual decides to "buy the whole

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[126] Debra Satz, Why Some Things Should not be for Sale: The Moral Limits of Markets (2010). See also Michael J. Sandel, What Money Can't Buy: The Moral Limits of Markets (2012); Michael Walzer, Spheres of Justice: A Defense of Pluralism and Equality (1983).

[127] See Black & Hu, supra.

[128] See, e.g., André Blais, To Vote or Not to Vote? The Merits and Limits of Rational Choice Theory (2000).

election." This is only possible because other individuals, confident in the victory of the socially optimal outcome, do not buy many votes. However if individuals irrationally buy a large number of votes, the threat of such an extreme spoiler vanishes, as it becomes too expensive for her to attempt to steal the election.

Meanwhile, while irrationality may explain why people vote as often as they do under a system of majority rule, it cannot *justify* majority rule relative to QV. Voter irrationality will increase the amount of voting but not stop majorities from expropriating from minorities.

Credit constraints. We have argued above that the willingness of the rich to pay for a dollar is not greater than the willingness of the poor to pay for a dollar and thus redistribution from the poor to the rich would not be a plausible outcome under QV. But, one might argue, the rich are more able to afford to pay for votes in the short term. Even if the willingness of the poor to pay is the same or greater, they might be unable to get access to the cash in the short-run.

The logic of the square function, however, not only makes this false, but actually reverses the logic. Suppose that there is an issue up for a vote favored by one person and opposed by 99 that would bring a benefit to the one person of $99 million and a harm to the 99 people of $1 million each. Suppose further that, without the bill passing, the lifetime income of the beneficiary is $100 million dollars and the lifetime income of those harmed is $1 million each. Thus one might think that the "poor" would have a hard time raising the cash: they are being asked to decide on a project that could deprive them of their lifetime wealth!

However, it is easy to see things are quite the reverse. In this case the chance that a marginal vote is pivotal will be roughly 4 thousandths of a percent.[129] This leads the beneficiary to want to buy about 2200 votes in favor and the opponents to want to buy 22 votes against each. This would cost the proponent about $5 million and the opponents $500 each. $5 million is 5% of the lifetime income of the proponent while $500 is 5 one-hundredths of a percent of the lifetime income of each of the opponents. It seems wildly implausible that it would be harder for each of these individuals to come up with $500 than it would be for the proponent to come up with $5 million. If, because individuals were irrational, they perceived a greater chance of their being pivotal, the calculation would be even more lopsided.

[129] See Weyl, supra note, for calculations.

Frivolous voting. One might be concerned that the redistribution under QV could give people an incentive to propose frivolous projects in order to force votes and benefit from the redistribution. Suppose, for example, that a person proposes that Illinois be sold to China. If the proposer does not vote, while others vote (presumably) against the proposal, the proposer will collect a share of the money spent for the votes. This would be possible in principle if anyone were allowed to put anything on the ballot. But that would not be a sensible way to set an agenda for QV votes. The system we instead propose is one where items are not placed up for votes unless they have sufficient support, the same way a referendum does not go forward onto a ballot unless it has collected sufficient signatures. Support under QV, however, would be judged not by the number of signatures but by the total willingness-to-pay to see the initiative on the ballot, as gauged by a QV initiative process.

In particular, individuals could cast as many votes as they want in support of the petition, paying the square of the number of votes they cast. The funds thus given would be transferred on to votes for the initiative if it made it onto the ballot. The item would be put up for a vote only if some support threshold were reached, say, 1% of the population in votes. This would ensure that no one could benefit by forcing others to vote on an issue; they could only get an item on the ballot by committing funds, which they would then be forced to pay.

Conclusion

Constitutional designers have struggled, with only limited success, to create political institutions that advance the common good. Authoritarian and oligarchic systems give a dictator or ruling class the responsibility of acting for the benefit of all, but fail to advance the public good because the individual or elite has no incentives—other than the fear of revolution—to do so. Democracy provides a method for the majority to influence outcomes directly, but it has never solved the problem of how to account for the varying intensity of preferences. Because majorities—both entrenched and temporary—can outvote minorities with intense preferences, democratic outcomes can cause more harm than good, and can lead to conflict and political disruption.

Various efforts to respond to this problem by using different voting rules or subjecting majority voting to constraints create additional problems. Supermajority rules, including bicameralism, cause gridlock, which harms everyone. Judicial enforcement of rights can block good outcomes as well as bad outcomes. The most successful countries have worked around institutional

limitations, using logrolling and campaign finance, for example, but these workarounds are themselves costly, imperfect, and controversial.

We have argued that QV provides a third way. It allows political institutions to aggregate preferences both across number of people and intensity of preferences. It thus should lead to better outcomes and less conflict. We doubt that wholesale replacement of political institutions with QV will occur anytime soon, but do believe that QV has enough promise that policymakers should consider experimenting with it in carefully controlled settings, as we have begun to do for smaller-scale group decisions.

Readers with comments should address them to:

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