Journal of Public Economics 94 (2010) 898–910

Contents lists available at ScienceDirect

Journal of Public Economics

journal homepage: www.elsevier.com/locate/jpube

Is the median voter decisive? Evidence from referenda voting patterns

Eric J. Brunner [a], Stephen L. Ross [b,*]

[a] Department of Economics, Quinnipiac University, 275 Mount Carmel Ave, Hamden, CT 06518, United States
[b] Department of Economics, University of Connecticut, 341 Mansfield Road, Unit 1063, Storrs, CT 06269-1063, United States

ARTICLE INFO

Article history:
Received 18 March 2009
Received in revised form 5 May 2010
Accepted 14 September 2010
Available online 24 September 2010

JEL classification:
H4
H7
I2

Keywords:
Median voter hypothesis
Referenda
Education spending

ABSTRACT

This paper examines whether the voter with the median income is decisive in local spending decisions. Previous tests have relied on cross-sectional data while we make use of a pair of California referenda to estimate a first difference specification. The referenda proposed to lower the required vote share for passing local educational bonding initiatives from 67 to 50% and 67 to 55%, respectively. We find that voters rationally consider future public service decisions when deciding how to vote on voting rules. However, the empirical evidence strongly suggests that an income percentile below the median is decisive for majority voting rules, especially in communities that have a large share of high-income voters with attributes that suggest low demand for public services. Based on a model that explicitly recognizes that each community contains voters with both high and low demand for public school spending, we also find that an increase in the share of low demand voters is associated with a lower decisive voter income percentile for the high demand group. This two type model implies that our low demand types (individuals over age 45 with no children) have demands that are 45% lower than other voters. Collectively, these findings are consistent with high-income voters with weak preferences for public educational services voting with the poor against increases in public spending on education.

1. Introduction

The median voter model has a long theoretical and empirical history within public economics. Since the pioneering work of Bergstrom and Goodman (1973), which established the conditions under which the median voter is also the voter with the median income, hundreds of studies have used the median voter framework to estimate demands for publicly provided goods and services.[1] The enduring popularity of the model stems both from its simplicity and its analytic tractability. As noted by Inman (1978), if governments act "as if" to maximize the preferences of the median income voter, the median voter hypothesis provides "a powerful starting point for predictive and normative analysis of government behavior."

Despite the wide spread popularity of the median voter model, the key assumption that the median voter is also the voter with the median income has been repeatedly challenged. [2] One of the central challenges has been Tiebout sorting, whereby household sort into communities based on their demand for public services. With sorting, communities may contain both higher income households with weak preferences for public services and lower income households with strong preferences for public services. Consequently, the median preference voter may not be the voter with the median income.[3] Epple and Platt (1998) develop a model that explicitly accounts for household sorting according to preferences and demonstrate that when households differ in terms of income and preferences, the median income voter is typically not pivotal. Rather, communities contain a continuum of pivotal voters differing in both income and preferences. Epple and Sieg (1999) and Epple et al. (2001) estimate structural models that allow for preference heterogeneity and enable them to estimate income elasticities in a model that explicitly identifies the median preference voters. Their results indicate

* Corresponding author.
E-mail addresses: eric.brunner@quinnipiac.edu (E.J. Brunner), Stephen.L.Ross@uconn.edu (S.L. Ross).

[1] A review of older studies that use the median voter framework to estimate demand can be found in Inman (1979). A few of the more recent studies include, Rothstein (1992), Silva and Sonstelie (1995), Stevens and Mason (1996), de Bartolome (1997) for school spending, Schwab and Zampelli (1987) for police, Duncombe (1991) for fire, Balsdon et al. (2003) for local general obligation bond issues, and Husted and Kenny (1997) for expansion of the voting franchise. The vast majority of studies are based on aggregate cross-sectional data. A smaller set of studies, including Bergstrom et al. (1982), Gramlich and Rubinfeld (1982) and Rubinfeld et al. (1987), use individual-level survey data to estimate demand for publicly provided goods and services.

[2] See Holcombe (1989) for a review of the criticisms and concerns surrounding the median voter model, and see Wildasin (1986) for an extended discussion of the assumptions required for the median voter model to be applied empirically.

[3] From a statistical perspective, Tiebout sorting induces a correlation between unobserved preferences for public services and observed incomes which leads to biased parameter estimates in a Bergstrom and Goodman style demand model. This bias has been dubbed Tiebout bias by Goldstein and Pauly (1981). See Ross and Yinger (1999) for a review of the literature on Tiebout bias.

0047-2727/$ – see front matter © 2010 Elsevier B.V. All rights reserved.
doi:10.1016/j.jpubeco.2010.09.009

substantial preference heterogeneity within communities, suggesting that the median preference voter is unlikely to be the voter with the median income.

More recently, Fletcher and Kenny (2008) develop a model in which the elderly, who typically have weak preferences for local educational services, vote with the poor in support of lower levels of education spending. They demonstrate that a larger share of elderly results in a pivotal voter who is further down a community's income distribution. Similarly, Epple and Romano (1996a,b) demonstrate that when there exist private alternatives to public goods or when public goods can be supplemented with private purchases, an equilibrium exists where the pivotal voter has an income that lies below the median. All three papers describe situations where low- and high-income voters with weak preferences or demand for public service provision form a coalition to oppose the preferences of middle and high-income voters with strong preferences; situations Epple and Romano (1996a,b) describe as "ends-against-the-middle."

In light of these challenges, numerous studies have attempted to test whether the voter with the median income is empirically relevant for describing local public service provision. Pommerehne and Frey (1976), Pommerehne (1978), Inman (1978), Turnbull and Djoundourian (1994) and Turnbull and Mitias (1999) evaluate the performance of the median voter model by examining whether the use of median income in local public service demand regressions outperforms other specifications (such as replacing median income with mean income). The results of those studies generally support the hypothesis that the median income voter is decisive.[4] On the other hand, Aronsson and Wikstrom (1996) test the predictive power of a model where the median income voter is assumed to be decisive against a more general statistical alternative. Their results lead them to reject the hypothesis that the voter with the median income is decisive.

A common feature of all these prior tests is that they rely on aggregate cross-sectional data to identify a relationship between public service expenditure levels and some measure of community income. These studies are likely biased because communities differ across a variety of dimensions including unobserved preferences for public services, the cost of providing public services, etc.; and these differences are likely correlated with the distribution of income in each community.[5]

In this paper, we propose an entirely new approach for testing the median voter hypothesis. We examine vote returns from a unique pair of California referenda that proposed changing the rules under which public spending decisions are determined. The first referendum, which failed, proposed to lower the required vote share for passing local educational bonding initiatives from 67 to 50%, and the second referendum, which was held only eight months later and passed, proposed lowering the vote requirement from 67 to 55%. Thus, assuming demand is monotonically increasing in income, the first referenda would have changed the identity of the decisive voter from the voter in the 33rd percentile of the income distribution to the 50th percentile while the second referenda would have changed the identity of the decisive voter from the voter in the 33rd percentile to the voter in the 45th percentile. Using the results from these two referenda, we test whether people vote "as if" future spending decisions will be based upon the preferences of the newly proposed decisive voter by examining whether the change in the fraction of 'yes' votes cast in the two elections can be explained by the implied change in the newly proposed decisive voter's income, i.e. the difference between the 50th and 45th percentile incomes in a jurisdiction.

Unlike previous tests of the median voter hypothesis, where public service spending is used to infer a relationship between the median voter's preferences and outcomes of the political process, our test infers that a median voter relationship holds because voters act as if the relationship holds when they cast their ballots to determine voting rules for choosing the level of public services provided. Consequently, our test avoids the fundamental problem of measuring the actual services demanded by voters within a jurisdiction which may be poorly proxied by the measures used in previous studies, such as expenditures per capita.[6] Furthermore, by regressing changes in the fraction of 'yes' votes between the referenda on changes in the income associated with the decisive voter in each district, we are able to difference out school district unobservables that are likely correlated with the distribution of income within a district and likely bias prior cross-sectional tests of the median voter hypothesis.

We find a strong relationship between the income distribution of a school district and the change in the fraction of 'yes' votes between the two referenda. This relationship, however, appears to arise most strongly from the influence of the income difference between the 40th and 35th percentiles on voting rather than the 50th and 45th percentiles. Specifically, while the income difference between the 50th and 45th percentiles can explain changes in voting between the two referenda, when we run a "horse race" between the changes in income between the 50th and 45th percentiles and the 40th and 35th percentiles, the difference between lower percentiles entirely captures the systematic relationship between the income distribution and voting.[7] These findings persist across a series of specifications controlling for changes in turnout and political representation between the two referenda, differences between small and large school districts, and demographic differences between school districts. The estimated relationship also persists for constant income elasticity models that allow for heterogeneity in the distribution of preferences across school districts. Furthermore, we find that the relationship between changes in the decisive voter's income and changes in vote shares does not hold for two counterfactuals estimated by replacing school districts with alternative definitions of jurisdiction based on census tracts and state assembly districts.

Having rejected the hypothesis that the median income voter is decisive, we proceed to examine whether our results are consistent with preference heterogeneity leading to an "ends-against-the-middle" outcome similar to the type described by Epple and Romano (1996a,b) and Fletcher and Kenny (2008). We split our sample based on the fraction of individuals in a district that are high-income and yet are expected to have weak preferences (i.e. households without children) or low demand (i.e. households with children in private school) for public education services and find evidence that points towards a *lower* income percentile decisive voter (further from the median) for districts with a greater fraction of high-income/low-demand households and a *higher* income percentile decisive voter for districts with a smaller fraction of such households.

In light of these findings, we estimate a final model in the spirit of Epple and Platt (1998) and Epple and Sieg (1999) where we explicitly recognize that each community contains both high and low demand voters. We use the share of voters who are past traditional childbearing age (45 years or older) and do not have school-age children to represent

[4] Using a revealed preference approach, Turnbull and Chang (1998) also find that local governments act "as if" to maximize the utility of the median income voter.

[5] For example, Schwab and Zampelli (1987) find that studies of public service demand that fail to take into account the impact of community characteristics on the cost of public service provision can yield very misleading results. See Ross and Yinger (1999) for a survey of studies that document cost heterogeneity across jurisdictions, as well as recent additional studies by Duncombe and Yinger (2005) and Reschovsky and Imazeki (2003).

[6] For example, as noted by Behrman and Craig (1987), "people pay taxes based on the city-wide amount of purchased inputs, but base their demand and voting behavior on the perceived level of neighborhood service output." Thus, to the extent that the services produced differ substantially across jurisdictions given the same public inputs, public spending will provide a poor proxy for public service provision.

[7] Note that the theory of referenda voting on which our empirical model is built holds as long as referenda voters' anticipation of future public service levels can be characterized by the demand of voters at a specific income percentile. This percentile need not be the 50th percentile.