

Political Economics

Silke Übelmesser (based on the script by Marko Köthenbürger)
CES, University of Munich

May 2007

1 Introduction

1.1 Motivating Examples

Consider 7 voters and 4 alternative policies (A, B, C, D) . The voters' preferences over the alternatives are:

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----|---|---|---|---|---|---|---|
| 1st | A | A | A | B | B | C | C |
| . | B | B | B | C | C | D | D |
| . | C | C | C | A | D | A | A |
| 4th | D | D | D | D | A | B | B |

The question now is how the political process aggregates individual preferences into a “social preference” which depends on the choice of the aggregation rule, i.e. voting rule.

At least 4 different voting can be distinguished:

Majority/Plurality rule: All alternatives are voted on simultaneously. The alternative which receives the maximum number of votes is selected in political process

$$\Rightarrow A : 3; B : 2; C : 2 \rightarrow A \text{ wins}$$

Pairwise voting without agenda setting (open agenda): Multiple voting rounds - in each round voting takes place over two alternatives (pairwise voting). The winning alternative is opposed against another option. The winning option in this round is opposed against another “untested” option and so on. The alternative which beats all other alternatives in a pairwise vote is the winner (Condorcet winner).

$\Rightarrow A \text{ vs } B \text{ } 5:2; A \text{ vs } C \text{ } 3:4; C \text{ vs } D \text{ } 7:0; C \text{ vs } B \text{ } 2:5; B \text{ vs } D \text{ } 5:2; B \text{ vs } A \text{ } 2:5 \rightarrow$ no Condorcet winner exists. This voting system fails to pick an alternative.

Pairwise voting with agenda setting (closed agenda): The agenda setter determines the order of pairwise voting. The alternative which survives the last round is the winner.¹ For instance,

$$\Rightarrow A \text{ vs } B \text{ } 5:2; A \text{ vs } C \text{ } 3:4; C \text{ vs } D \text{ } 7:0; C \text{ wins}$$

$$\Rightarrow A \text{ vs } C \text{ } 3:4; C \text{ vs } B \text{ } 2: 5; B \text{ vs } D \text{ } 5:2; B \text{ wins}$$

$$\Rightarrow D \text{ vs } C \text{ } 0:7; C \text{ vs } B \text{ } 2: 5; B \text{ vs } A \text{ } 2:5; A \text{ wins}$$

Borda rule: All alternatives are voted on simultaneously. Each voter receives $k + (k - 1) + (k - 2) + \dots + (k - k)$ points which he/she can allocate to the alternatives. The most preferred

¹Without an agenda setter the winning alternative must beat all other alternatives in a pairwise vote.

alternative gets k points, the next most preferred one $k - 1$ points and so on. The winning alternative is the one which receives the maximum number of points. For $k = 1$ the Borda rule and the Majority/Plurality rule coincide.

$k = 1: \Rightarrow A: 3; B: 2; C: 2 \rightarrow A$ wins

$k = 2: \Rightarrow A: 6; B: 7; C: 6; D: 2 \rightarrow B$ wins

$k = 3: \Rightarrow A: 12; B: 12; C: 13; D: 5 \rightarrow C$ wins

Punchline: Even in this subset of possible political mechanisms the choice of the aggregation rule is decisive for the political outcome: The **will of society** is highly sensitive to the specifics of the political process and is thereby **ambiguous**.

1.2 “Desirable” voting rules

If voting rules lead to different outcomes how should society decide among them? One may wish to select the voting rule which exhibits desirable properties. The idea is to have a socially acceptable rule.

What are desirable properties of voting rules? Frequently mentioned principles are:

- Anonymity: This is one of the fundamental principles of democracy. The political outcome should not depend on the identity of the voters - only individual preferences should matter, i.e. a rich voter or a member e.g. of the political elite/aristocracy matters as much as any other voter. This principle rules out dictatorships.

- Neutrality: The voting rule should not introduce a bias in favor of one option. All options should be treated alike.

- Decisiveness: The voting rule must pick a winner.

- Positive responsiveness: Increasing the vote for the winning option should not lead to declare another option a winner.

With only two alternatives we have a powerful result:

Theorem 1 (May’s Theorem) With only two options the majority rule is the only voting rule which satisfies the requirements of anonymity, neutrality, decisiveness and positive responsiveness.

Proof: See Mueller, 2003, p. 135.

With only two options the majority rule coincides with the simple majority rule. The alternative which receives more than 50% of the votes is the winner.

Is there a normative justification for the widespread use of the majority rule? This primarily depends on whether or not the assumption of “two alternatives” is realistic.

⇒ In politics generally more than two alternatives are discussed. However, when it comes to voting only one proposal is typically voted on at a time - i.e. voters face the two alternatives: YES or NO.

If more than two alternatives are subject to voting, the neat normative properties of the majority rule (implied by May’s Theorem) do not hold in general. It is thus worthwhile analyzing whether a “restructured” political process still satisfies the requirements of May’s Theorem. One strategy is to introduce pairwise voting. At each voting stage there are only two alternatives on the table and May’s Theorem consequently applies at each of these voting stages.

1.3 Voting: One-Dimensional Voting

Example 2.1: Consider pairwise voting without an agenda setter. The preferences of three voters over three alternatives are as follows:

| | | | |
|-----|---|---|---|
| | 1 | 2 | 3 |
| 1st | A | B | C |
| . | B | C | A |
| 3rd | C | A | B |

A vs. B: 2:1; A vs. C: 1:2; C vs. B: 1:2; B vs A: 1:2 and so on. Voting is cyclical.

To formally describe voting cycles, we introduce the concept of transitivity:

Definition 2 (Transitivity) If A is weakly preferred to B and B is weakly preferred to C, then A must be weakly preferred to C, i.e. if $A \succeq B$ and $B \succeq C$, then $A \succeq C$.

Return to example 2.1: A is preferred to B and B is preferred to C, but A is not preferred to C. The social preferences are intransitive.

insert fig. 2.1 here

1.3.1 Median voter theorem with single-peakedness

Discrete choice: The concept of transitivity (and thus the existence of voting cycles) is related to the notion of single-peakedness.

Definition 3 (Single-peakedness) Let q_i^* denote voter i 's most preferred alternative. Then, if $q'' \leq q' \leq q_i^*$ or $q'' \geq q' \geq q_i^*$, it follows that $u_i(q'') \leq u_i(q')$.

Observe that in example 2.1 voter 3's preferences are not single-peaked while voter 1's and 2's preferences are single-peaked. If voter 3's preferences were $C \succ B \succ A$, the preferences would be single-peaked as well. Verify that social preferences are now transitive. B wins against all other alternatives in a pairwise vote (B is the **Condorcet winner**).

Are preferences in the introductory example (7 voters/4 alternatives) single-peaked?

insert fig. 2.2 here

Preferences of individual 6 and 7 are not single-peaked which leads to voting cycles. Only the choice of an agenda-setter breaks the voting cycle in the example.

Punchline: A condition for voting cycles not to arise is that individual preferences are single-peaked. More explicitly,

Theorem 4 (Median voter theorem (single-peakedness version)) If there is an odd number of voters, individual preferences are single-peaked and the policy space is one-dimensional, then the median of the distribution of the voters' most preferred alternatives wins in a pairwise vote (Condorcet winner).

Return to the modified version of example 2.1. The median of the voters' most preferred alternatives is B which is indeed the winning alternative. The voter whose most preferred alternative is the median of the distribution is called the Median Voter.

Continuous choice: In most economic applications voters are asked to make a non-discrete choice - examples include the choice of taxes which when levied as ad-valorem taxes are an element of the unit interval and the amount of transfers. In these applications the condition of single-peakedness is related to the curvature properties of the political preference function. If it

is quasi-concave in the political choice variable (e.g. the tax rate), then the preference function has a “single peak” and the median voter theorem stated above readily applies.

It is important to note that the condition has to be satisfied by the political preference function. One may wonder whether strict concavity (or more mildly quasi-concavity) of political preferences is not always guaranteed by strict concavity (or quasi-concavity) of the underlying preference function (direct utility function) - an assumption which is usually invoked in economics. However, the assumption does not necessarily carry over to the political preference function. The latter distinguishes from the direct utility function by the fact that it also reflects optimal individual choices (e.g. labor supply and savings decision) and general equilibrium effects. The following examples illustrate the difference:

Example 2.2: Assume individuals have preferences over private and public consumption $u^i = c + \theta^i b(g)$ with $b' > 0$ and $b'' < 0$. Private consumption c equals income I (exogenously given) minus taxes T , $c = I - T$. θ^i measures the preference for public consumption g . Taxes finance public consumption. With a continuum of individuals whose size is normalized at unity the public budget constraint reads $g = T$. The political preference over the tax rate is

$$u^i = I - T + \theta^i b(T).$$

The first-order condition reads $-1 + \theta^i b' = 0$. The second-order condition $\theta^i b''$ is negative (by strict concavity of $b(g)$). Here, strict concavity of the direct utility function ensures strict concavity (and thus single-peakedness) of political preferences.

Example 2.3: Consider a modification to the example analyzed above. Individuals also derive utility from consuming leisure ℓ according to $u^i = c + h(\ell) + \theta^i b(g)$ with $h' > 0$ and $h'' < 0$. The time endowment of each individual (normalized at unity) can be used either to earn income via supplying labor L or to consume leisure, $L + \ell = 1$. The constant wage rate per unit of labor supply is w which is subject to a labor income tax τ . Private consumption is $c = w(1 - \tau)L$.

As an economic agent each individual takes the tax rate and the level of public consumption as given. They choose labor supply $L = 1 - \ell$ such that

$$u^i = w(1 - \tau)L + h(1 - L) + \theta^i b(g)$$

is maximized. The first-order condition $w(1 - \tau) - h' = 0$ gives a labor supply function $L^*(w(1 - \tau))$. The response of labor supply to a marginal increase in the tax rate can be obtained by differentiating the first-order condition with respect to τ and L^* which gives

$$\frac{dL^*}{d\tau} = \frac{w}{h''} < 0.$$

When thinking about the most preferred policy choice individuals take the effect on labor supply into account. The most preferred tax rate follows from maximizing

$$u^* = w(1 - \tau)L^* + h(1 - L^*) + \theta^i b(w\tau L^*).$$

The first order condition is $-wL^* + \theta^i b' wL^* + w\tau \frac{dL^*}{d\tau} = 0$.² Again, in order to check the concavity of the political preference function we compute the second order condition:

$$-w \frac{dL^*}{d\tau} + \theta^i b'' wL^* + w\tau \frac{d^2 L^*}{d\tau^2} + \theta^i b' \left(2w \frac{dL^*}{d\tau} + w\tau \frac{d^2 L^*}{d\tau^2} \right) = 0$$

where

$$\frac{d^2 L^*}{d\tau^2} = \frac{wh''' \frac{dL^*}{d\tau}}{(h'')^2}.$$

Note, the sign of h''' is not predetermined. As a consequence, the second order condition may be positive or negative in sign. Although the direct utility function exhibits strong regularity properties, single-peakedness of the induced political preferences is not guaranteed.

1.3.2 Median voter theorem with single-crossing

Discrete choice: Single-peakedness is only a sufficient condition for voting cycles not to arise as illustrated in example 2.4.

Example 2.4:

| | 1 | 2 | 3 |
|-----|---|---|---|
| 1st | A | A | C |
| . | B | B | A |
| 3rd | C | C | B |

A vs. B: 2:1; A vs. C: 2:1 \implies A wins

A is the Condorcet winner although voter 3's preferences are not single-peaked, see fig. 2.3:

insert fig. 2.3 here

A second condition which rules out voting cycles is the condition of single-crossing.

²The first-order condition has been simplified using the first-order condition for labor supply $w(1 - \tau) = h^0$.

Definition 5 (single-crossing) Preferences are single-crossing if for any two voters i and j ($i < j$) and for any two alternatives q' and q'' with $q' < q''$, we have

$$\begin{aligned} u_j(q') &> u_j(q'') \Rightarrow u_i(q') > u_i(q'') \text{ and} \\ u_i(q'') &> u_i(q') \Rightarrow u_j(q'') > u_j(q'). \end{aligned}$$

One way to illustrate the definition is to assume that voter can be ranked from the left to the right according to their ideology (i is to the left of j). In this context the first condition basically says that if a more left-wing policy q' (reflected by $q' < q''$) is preferred by a voter then all voters to the left of her should also prefer this policy to a more right-wing policy. Similarly, the second condition says that if a more right-wing policy q'' (reflected by $q' < q''$) is preferred by a voter, then all voters to the right of her should also prefer this policy to a more left-wing policy. to think about a policy on the left-right spectrum. Implausible?

Example 2.4 (contd.): Assume $A < B < C$. Are these preferences single-crossing?

- voters 1 and 3 (1 is the left voter); alternatives A and C (A is the “left” alternative) → no contradiction possible
- voters 1 and 3 (1 is the left voter); alternatives B and C (B is the “left” alternative) → no contradiction possible
- voters 1 and 3 (1 is the left voter); alternatives A and B (A is the “left” alternative) → $u_3(A) > u_3(B) \Rightarrow u_1(A) > u_1(B)$ ✗

(equivalently for voter 2)

Example 2.5: Assume $A < B < C$.

| | | | |
|-----|---|---|---|
| | 1 | 2 | 3 |
| 1st | A | B | C |
| . | B | A | B |
| 3rd | C | C | A |

Are the preferences single-crossing?

- voters 1 and 2 (1 is the left voter); alternatives B and C (B is the “left” alternative) → $u_2(B) > u_2(C) \Rightarrow u_1(B) > u_1(C)$ ✗
- voters 1 and 2 (1 is the left voter); alternatives A and C (A is the “left” alternative) → $u_2(A) > u_2(C) \Rightarrow u_1(A) > u_1(C)$ ✗

No contradiction can be constructed for any other combination of voters and policy alternatives.

\implies preferences are single-crossing (and single-peaked): B is the Condorcet winner.

insert fig. 2.4 here

The concept of single-crossing allows us to state a 2nd version of the Median voter theorem:

Theorem 6 (Median voter theorem (single-crossing version)) If there is an odd number of voters, individual preferences are single-crossing and the policy space is one-dimensional, then the option most preferred by the voter with a median innate characteristic is the Condorcet winner.

Some remarks:

- The order $i < j$ (j is to the right of i) is meant to be an invariant order reflecting innate characteristics such as the political ideology, exogenous productivity or taste for public goods. In these cases the order $i < j$ reflects that individual j has a higher productivity or values public consumption more than individual i .
- Both concepts (single-peakedness and single-crossing) are logically independent. Either of both concepts may arise independently of whether the other condition applies - see examples 2.4 and 2.5.
- The concept of single-crossing is an ordinal concept. It only requires political preferences to be monotone in the type of the voter, i.e. voters with a higher productivity prefer lower redistributive taxes.
- With single-crossing the politically decisive voter is the one who is the median of the invariant order of types (e.g. who has median productivity or median taste for public consumption). This is contrary to the median voter theorem with single-peakedness which characterizes the politically decisive voter as the one whose preferred alternative is the median of the distribution of the most preferred alternatives. More simply, if single-crossing applies, the identity of the politically decisive voter can be deduced from the invariant order of types. Single-peakedness in contrast requires to first compute the preferred policy alternative of each voter. In a second step, the politically decisive voter can be deduced from the implied distribution of preferred alternatives.

- The two conditions are only sufficient conditions for a Condorcet winner to exist. It is still possible that a Condorcet winner exists although individual preferences do not satisfy either of both conditions - see example 2.6.

Example 2.6: Assume $A < B < C$.

| | 1 | 2 | 3 |
|-----|---|---|---|
| 1st | A | B | C |
| . | B | A | A |
| 3rd | C | C | B |

Voters 2 and 3 (2 is the left voter); alternatives A and B (A is the “left” alternative) → $u_3(A) > u_3(B) \Rightarrow u_2(A) > u_2(B)$ not satisfied

⇒ Preferences are neither single-crossing nor single-peaked (voter 3’s preference has two peaks - see fig. 2.5). But a Condorcet winner exists: A vs. B: 2:1; A vs. C: 2:1 → A is the Condorcet winner.

insert fig. 2.5 here

Continuous choice If majority voting involves a non-discrete choice, it suffices in many economic applications to check that the marginal rates of substitution are monotone in the voters’ type. Whether preferences are single-crossing can be easily verified in the case of an effectively one-dimensional policy space. In this case one can resort to a basic finding in Milgrom (1994) whose relevance for majority voting is illustrated in Gans and Smart (1996). The finding says that with an effectively one-dimensional policy space political preferences are single-crossing if and only if they satisfy the Spence-Mirrlees condition. A little bit more formally:

Theorem 7 Let the policy variables be $(x, y) \in R^2$ and the political preference function be given by $u(x, y, \theta)$ with $y(x)$ and $\theta \in R$. Then $u(\cdot)$ is single-crossing if and only if $u(\cdot)$ satisfies the Spence-Mirrlees condition for any $(x, y) \in R^2$.

General illustration of the Spence-Mirrless condition: Assume utility is derived from x and y according to $u^i(x, y, \theta)$ where θ is an individual-specific preference parameter. The Spence-Mirrlees condition requires the marginal rate of substitution between x and y to vary monotonically with the individual’s type θ . Formally,

$$\frac{dx}{dy} = - \frac{\partial u^i}{\partial y} / \frac{\partial u^i}{\partial x}$$

must be either increasing or decreasing in θ for any combination (y, x) . The upper panel in figure 2.6 provides a graphical illustration of the Spence-Mirrlees condition. Individual 2's indifference curve is steeper than individual 1's indifference curve, i.e. individual 2 has a higher preference for good y relative to individual 1. To the extent that this holds for any combination of (y, x) , preferences satisfy the Spence-Mirrlees condition. The lower panel in figure 2.6 depicts indifference curves which are not single-crossing. Individual 2's indifference curve is steeper at the upper-left intersection and lower at the lower-right intersection.

insert fig. 2.6. here

Example 2.2 (contd.): The political preference function is defined over the two policy variables T and g , i.e. $u^i = I - T + \theta^i b(g)$. Effectively, the policy problem is one-dimensional since T and g are uniquely linked via the public budget constraints, $g = T$. Thus, g is a function of T , i.e. $g(T)$. The marginal rate of substitution between T and g is

$$\begin{aligned} \frac{dT}{dg} &= -\frac{\partial u^i}{\partial g} / \frac{\partial u^i}{\partial T} \\ &= \theta^i b'(g). \end{aligned}$$

The marginal rate of substitution is increasing in the preference type θ^i which guarantees single-crossing.

Example 2.3 (contd.): Political preferences are defined over the policy variables τ and g as given by

$$u^* = w(1 - \tau)L^* + h(1 - L^*) + \theta^i b(g).$$

Again, expenditures are a function of the tax rate, i.e. $g(\tau)$. The slope of the indifference curve in (g, τ) space is

$$\begin{aligned} \frac{d\tau}{dg} &= -\frac{\partial u^i}{\partial g} / \frac{\partial u^i}{\partial \tau} \\ &= \frac{\theta^i b'(g)}{wL^*}. \end{aligned}$$

Since b' and L^* are independent of θ^i , the marginal rate of substitution is strictly increasing in the voter's type θ^i . Note, as shown above the political preference function may not be single-peaked. However, it is single-crossing. As a consequence, the single-crossing version of the Median Voter Theorem can be invoked in characterizing the political equilibrium.

1.3.3 Relevance of the Median Voter Theorem

In a recent paper Gerber and Lewis (2004) have analyzed to what extent the median voter theorem can explain real-world political choices. In a nutshell, they approach the question whether a legislator's behavior is tied to the median preference of the district the legislator represents.

Data and Methodology: The authors estimate preferences of Los Angeles County voters based on a variety of elections in 1992. The vote choices include races for federal, state, county and local legislative offices. A second source of data are voter choices revealed in a number of state-wide and local ballot measures on various topics ranging from taxation of candies, property tax exemption of home of person who dies while on active military service, to the introduction of congressional term limits. The voting record used in the analysis contains a complete enumeration of all the vote choices made by a given voter, as well as identifying information about the legislative district in which the ballot was cast. You may wonder where the data come from given that elections are anonymously held. The rich information data base is a by-product of the punch card ballot system used in the 1992 elections.

Voters are grouped according to his/her ideology. Voters who support three times the republican candidate out of the four races for legislative office are classified as republicans (similar for democrats). The remaining set of voters are classified as independent voters. For each of these subgroups the authors compute the voter preference using data from the state-wide ballot measures. The median preference exhibits some interesting properties. It is more to the left when the share of low-income households and the share of high income households becomes larger. The median voter is also more to the left the higher the educational attainment of the population is - see table 1.

The legislators behavior is inferred from their roll call votes, i.e. from the record of how the district's legislator voted on a piece of legislation.

Results: If the median voter theorem is valid, the legislator's behavior must follow from the median voter preference. To formally test for it the authors first regress the median preference on the legislator behavior. The validity of the median voter reasoning can be inferred from two sources:

1. The median preference and legislator behavior should exhibit a certain degree of co-movement, i.e. the coefficient has to be positive and statistically significant. This is a

ANALYSIS OF PREFERENCE ESTIMATES: OLS REGRESSION COEFFICIENTS ($N=55$)
 Dependent Variable: Estimate of Overall Median or Partisan Median Preference

| Independent Variable | Median Preference | | Democratic Median Preference | | Independent Median Preference | | Republican Median Preference | |
|-------------------------|-------------------|----------------|------------------------------|----------------|-------------------------------|----------------|------------------------------|----------------|
| %Nonwhite | -1.67 (.26) | -.67 (.13) | -1.32 (.20) | -.67 (.15) | -.17 (.17) | .08 (.19) | .35 (.17) | .02 (.17) |
| %Income <\$20,000 | -5.28 (.62) | -2.63 (.31) | -4.48 (.48) | -2.76 (.37) | -3.73 (.40) | -3.26 (.46) | -1.94 (.41) | -2.90 (.43) |
| %Income >\$75,000 | -3.09 (.92) | -1.17 (.40) | -2.87 (.71) | -1.62 (.48) | -1.67 (.60) | -1.34 (.61) | -.42 (.61) | -1.11 (.56) |
| %Education >high school | -2.17 (.47) | -1.55 (.20) | -2.57 (.36) | -2.16 (.23) | -.78 (.30) | -.67 (.30) | .02 (.31) | -.21 (.28) |
| %Clinton | | -2.37 (.15) | | -1.54 (.18) | | -.42 (.23) | | .87 (.21) |
| Constant | 4.37 (.39) | 4.10 (.16) | 3.59 (.30) | 3.41 (.19) | 2.43 (.25) | 2.38 (.25) | 1.80 (.26) | 1.89 (.23) |
| R^2 | .81 | .97 | .80 | .91 | .73 | .74 | .39 | .54 |

SOURCE.—District characteristics are taken from the 1990 U.S. Census. %Clinton is taken from California Secretary of State (1992b).

NOTE.—The unit of analysis is the legislative district. Standard errors are in parentheses. Bivariate regressions of each of the four dependent variables on %Clinton alone have R^2 's of .89, .59, .51, and .02, respectively.

Figure 1:

fundamental condition for the median voter theorem to be empirically relevant.

2. The share of legislative behavior explained by the median preference (measured by R^2) should be sufficiently high.

The regressions are summarized in table 2. In the baseline regression the coefficient of median preference is positive. The R^2 is 0.37 leaving a significant amount of variation in legislator behavior unexplained. In the second regression party ideology is included as an explanatory variable. The sign of the coefficient is positive. The fit of the regression increases to $R^2 = 0.92$ with the consequence of rendering the effect of median preference insignificant. In the third regression the authors additionally allow for interaction between median preference and the variance within each district. The R^2 is slightly increased to 0.93. Representing the main result of the paper, the interaction term has a negative impact of legislators behavior while the median preference has once again a positive and significant effect on legislator's behavior. The third regression gives the main result of the paper:

In heterogenous districts legislator's behavior appears to be less related to the median voter preference.

Possible explanantions for why legislators deviate from the district median in heterogenous districts include lobbying (policy for campaign contributions; incentives to lobby in heterogenous

DETERMINANTS OF LEGISLATOR BEHAVIOR: OLS REGRESSION COEFFICIENTS (N=55)
Dependent Variable: Legislator's First-Dimension NOMINATE Score

| Independent Variable | Model 1 | Model 2 | Model 3 | Model 4 |
|---------------------------------|---------------|---------------|---------------|---------------|
| Median preference | .87 (.15) | .09 (.07) | .75 (.28) | .86 (.31) |
| Party ideology | | 1.12 (.06) | 1.07 (.06) | 1.22 (.19) |
| Median preference × variance | | | -.29 (.12) | -.30 (.12) |
| Partisan preference | | | | -.12 (.15) |
| Constant | -.49 (.09) | -.07 (.04) | -.14 (.05) | -.13 (.05) |
| R^2 | .37 | .92 | .93 | .93 |

NOTE.—Standard errors are in parentheses. Median preference and variance are as described in table 2. Party ideology is the median NOMINATE score of the members of a legislator's party delegation in his or her chamber. Partisan preference is Democratic median preference for Democratic legislators and is Republican median preference for Republican legislators (there are no Independent legislators in our sample).

Figure 2:

districts tend to be larger) and party loyalty (party re-election concerns can be more easily traded-off against the median preference if voters do not easily detect such a deviation).

References

- [1] Gans, J.S. and M. Smart (1996), Majority Voting with single-crossing preferences, *Journal of Public Economics*, 59, 219 - 237.
- [2] Gerber, E.R. and J.B. Lewis (2004), Beyond the Median: Voter Preferences, District Heterogeneity, and Political Representation, *Journal of Political Economy*, 112, 1364 - 1383.
- [3] Milgrom, P. (1994), Comparing Optima: Do Simplifying Assumptions Affect Conclusions? *Journal of Political Economy*, 102, 607 - 615.
- [4] Mueller, D. (2003), *Public Choice III*, Cambridge University Press, Cambridge.
- [5] Persson, T. and G. Tabellini (2000), *Political Economics - Explaining Economic Policy*, MIT Press, Cambridge.

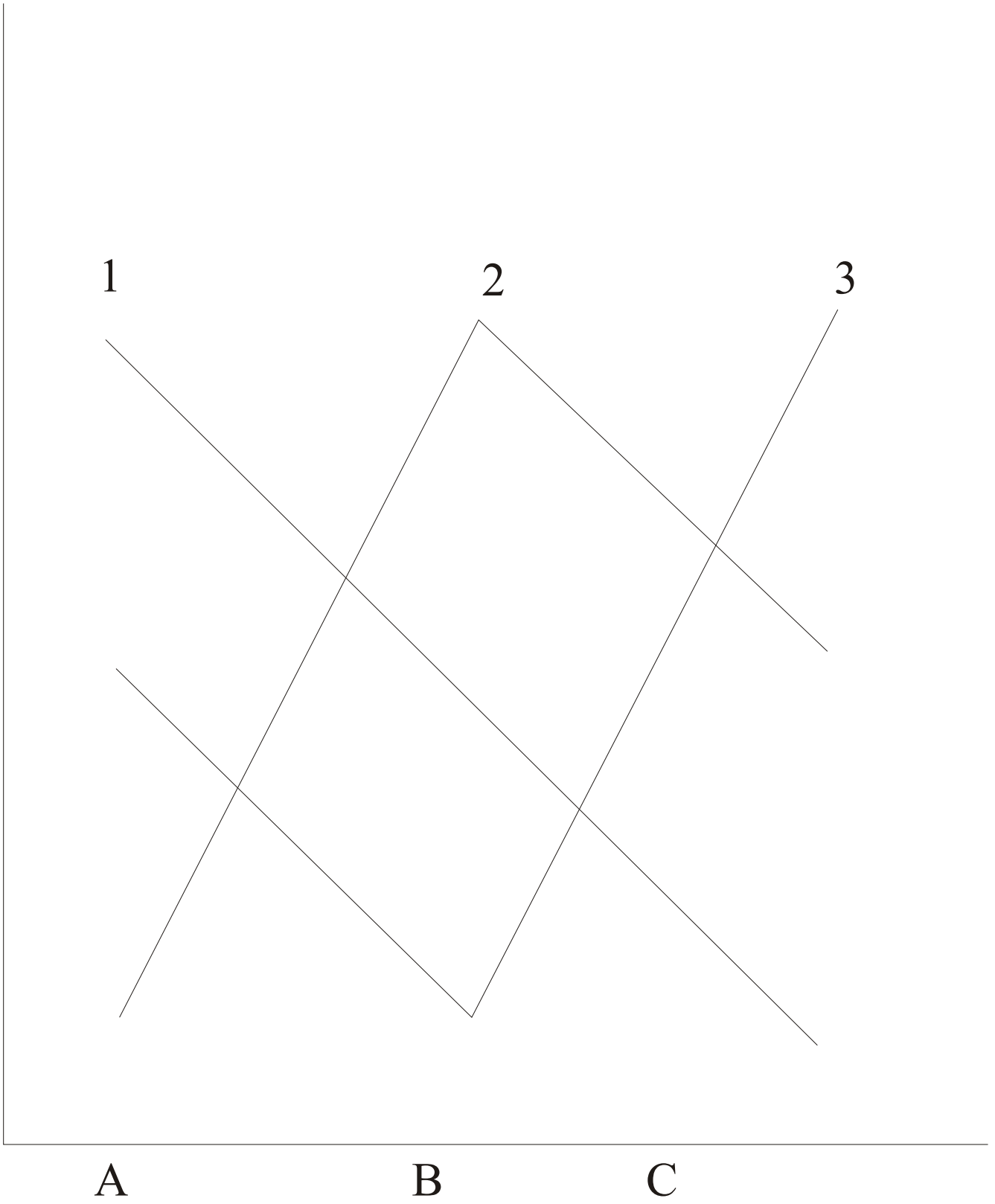


Fig. 2.1

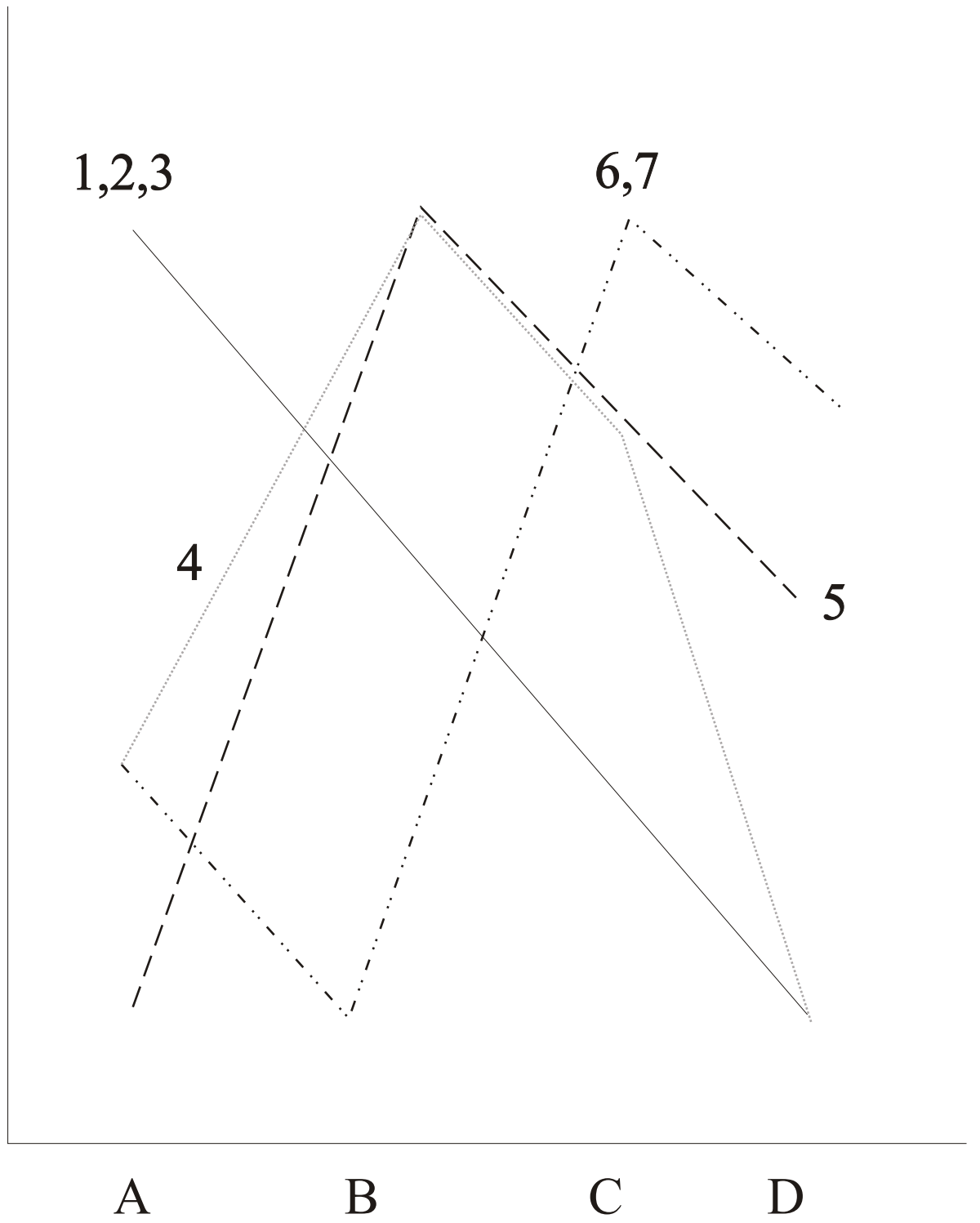


Fig. 2.2

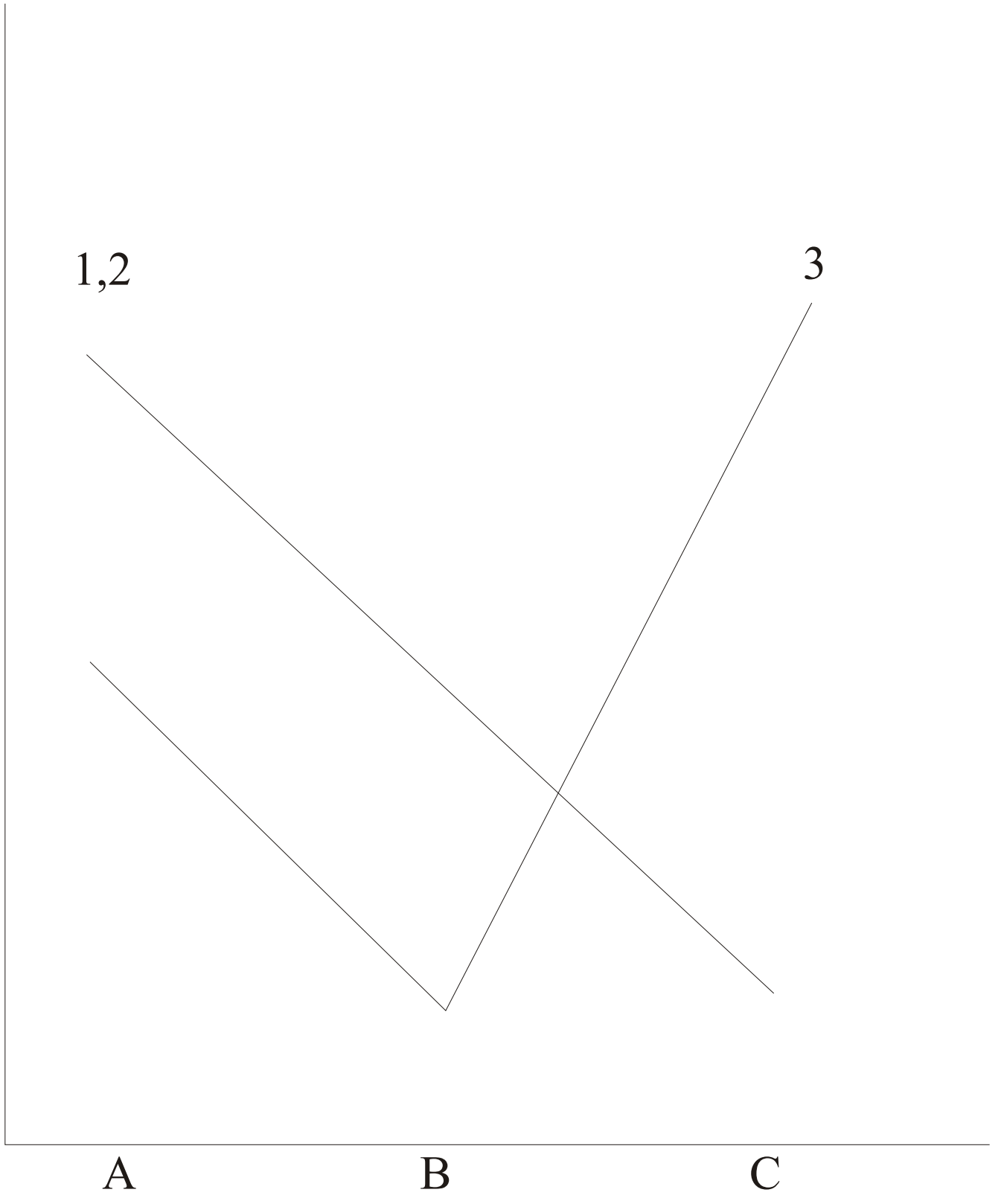


Fig. 2.3

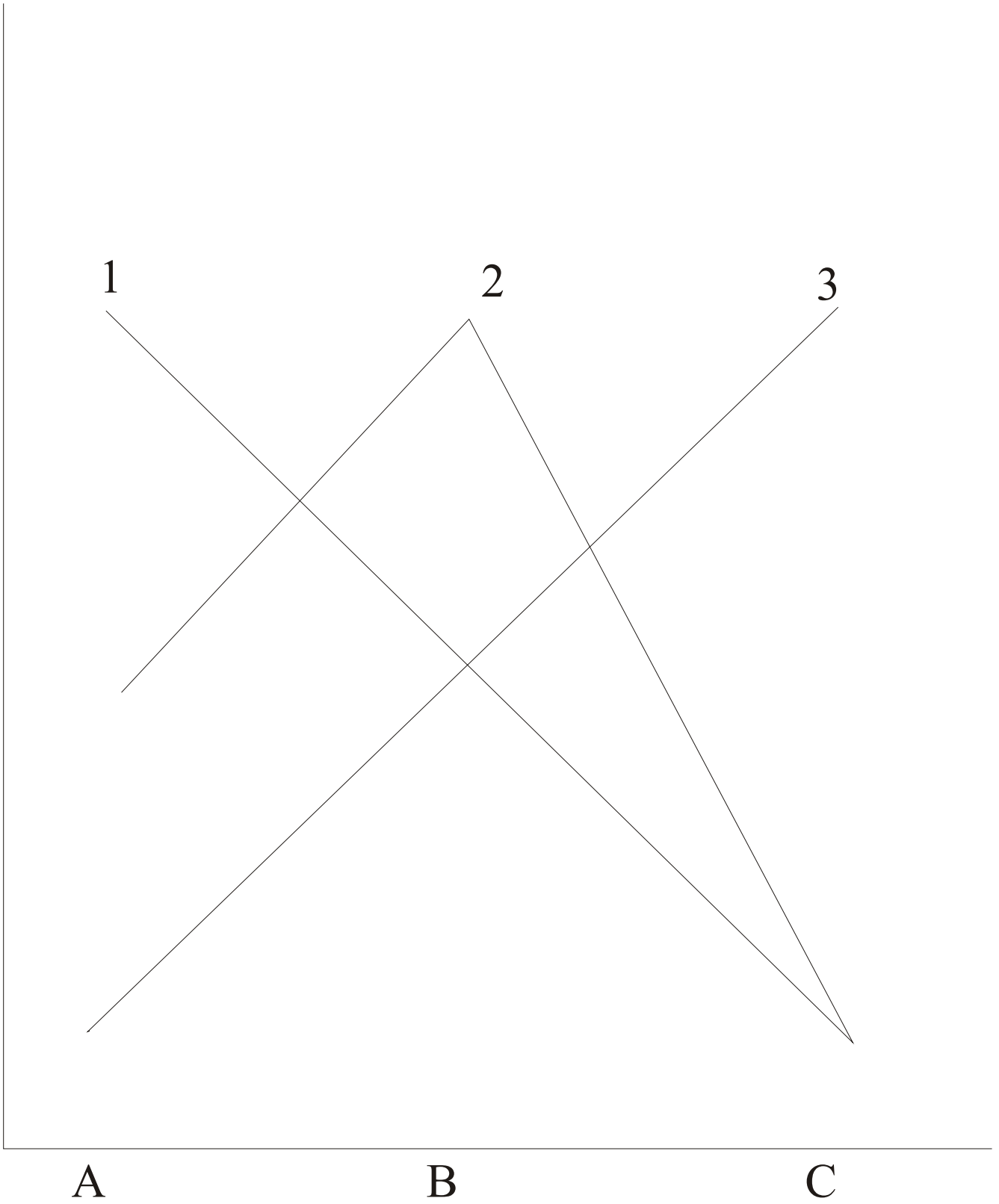


Fig. 2.4

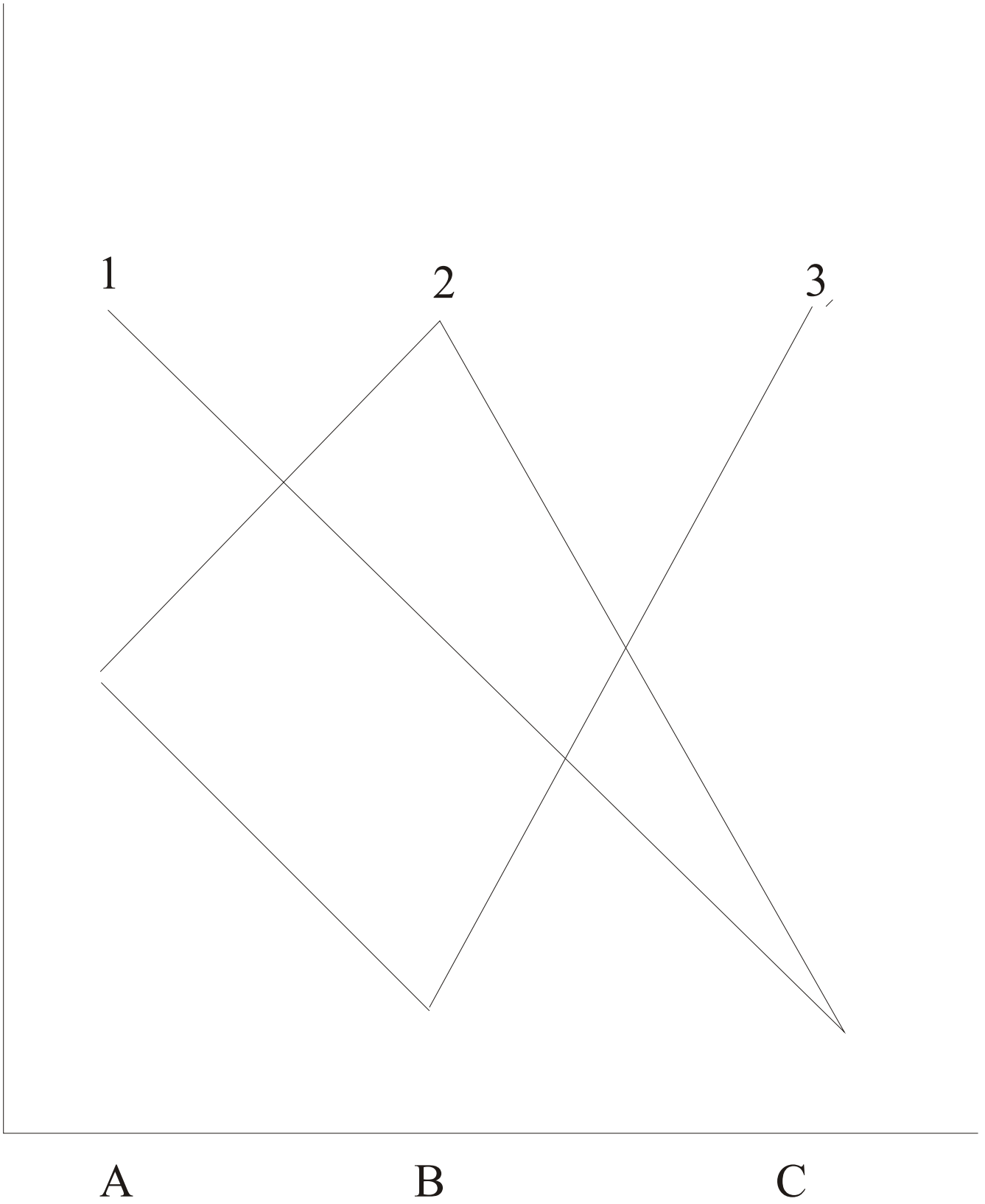
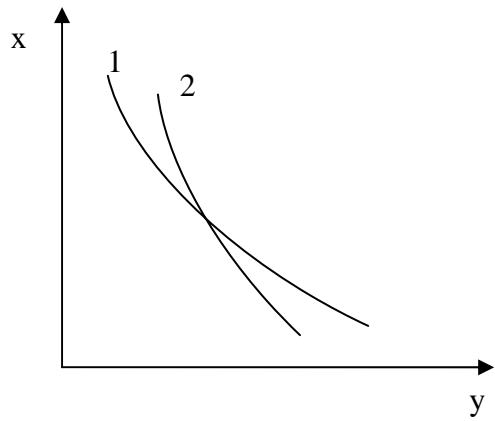
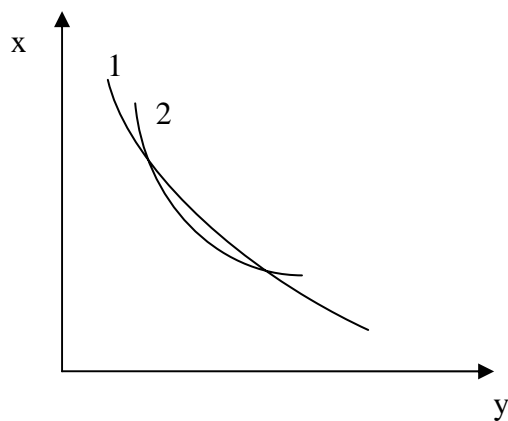


Fig. 2.5



Single-crossing preferences



Non-single-crossing preferences

Figure 2.6