

Turnover and Accountability of Appointed and Elected Judges

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Abstract

We propose a novel empirical framework for comparing two different political institutions, focusing on selection and retention of state court judges in the U.S. Under one system, when there is an open seat, the governor appoints a new judge; when the term of the judge expires, he faces an up-or-down majority decision by voters, without facing challengers. Under the other system, judges are selected and re-elected through competitive elections. We estimate a dynamic model to quantify the degree of reelection concerns imposed on judges' decisions and to jointly analyze underlying preferences of judges, using individual-level criminal sentencing and reelection data.

Keywords : Selection, Appointment, Election, Turnover, Accountability, Judges, Sentencing

JEL classification : D72, D78, H79, K0

1 Introduction

Understanding systems concerning the selection and retention of public officials and their effects on policy outcomes has long been a key issue in economics.¹ In this paper, we propose a novel empirical framework for comparing two different political institutions, focusing on the systems for

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¹See Barro (1973), Ferejohn (1986), and Banks and Sundaram (1998) for the early literature.

selecting and retaining state court judges in the United States.² Under one system (**‘appointment and up-or-down vote’**), when there is an open seat on the bench, the governor appoints a new judge; when the term of the judge expires, he has to face an up-or-down (i.e., yes-or-no) majority decision by the voters, without facing a challenger. If an incumbent judge fails to gain the support of the majority of voters, his seat becomes vacant, and the governor appoints a new judge. Under the other system (**‘competitive election’**), judges are selected and re-elected through competitive elections.³ The purpose of this study is to analyze the relationship between this institutional variation and judges’ decisions in the court, investigating the role of various factors behind judges’ decisions under the two systems.

Understanding the effects of these two systems have a far-reaching implication. First, public officials that constitute governments are selected in either one of the two ways: appointment or election. Legislators and the head of the executive branch are usually elected. And, middle-level bureaucrats and judges in most countries outside the U.S. are appointed. Thus, understanding difference between appointment and election is essential to understanding the operation of governments. (See Alesina and Tabellini (2007, 2008) for a normative discussion on this issue.) Second, there are several public offices where similar variation of selection rules apply, such as school boards and regulators. (See Besley and Coate (2003) for an analysis of regulators.) Understanding the institutional variation for judges can also enhance the understanding of the institutional variation for other public offices.

In this study, we focus on judges’ reelection concerns, preferences and their effect on court decisions under the two systems. We use data from the State of Kansas, where both systems are used to select and retain state district court judges.⁴ Figure 1 shows the defeat rates of elected and

²State courts play a major role in the American judicial system. In 2004, compared with federal courts, state courts had 12 times more civil case filings and 47 times more criminal case filings. (See National Center for State Courts (2005) and U.S. Courts (2004) for details.)

³In the United States, sixteen states currently use appointment and up-or-down vote, and nineteen states use competitive elections. There are also states that use different types of systems such as appointment-and-reappointment or appointment-with-life-tenure. Since the first two systems are dominantly used, we focus our analysis on the difference between the two.

⁴Even though data from one state may not give as wide a perspective as national-scale data, it helps us to avoid problems caused by substantial heterogeneity in state laws that cross-state analysis may suffer. Kansas can also be regarded as a “typical” state in terms of the characteristics of the legal profession. In terms of the population/lawyer

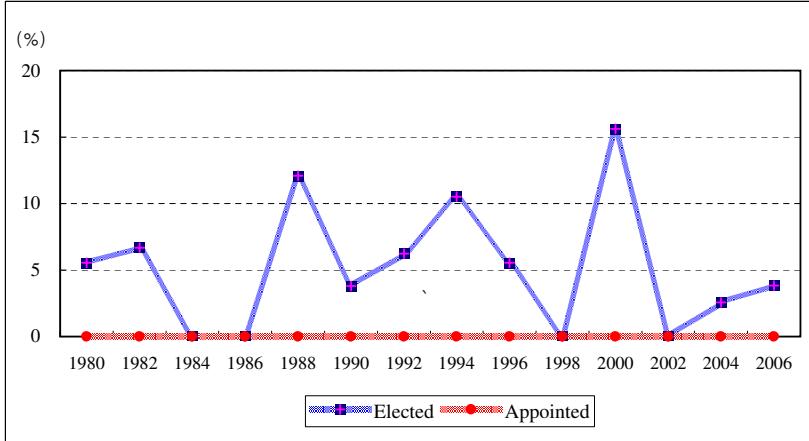


Figure 1: Defeat Rates of Appointed and Elected Judges in Kansas

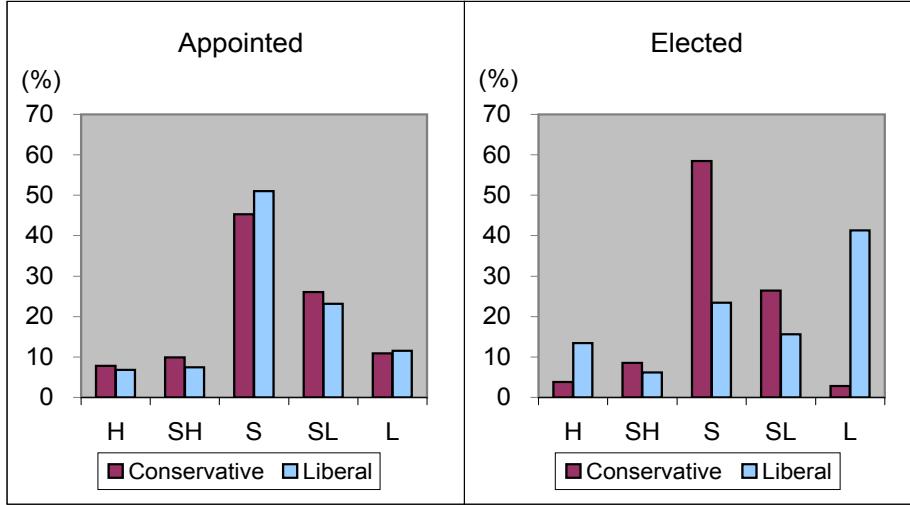
appointed judges in Kansas. The defeat rate of elected judges (the upper graph in Figure 1) shows high fluctuation across time. While there are election years in which no defeats occur, 15.6 percent of elected incumbent judges who chose to run failed in the 2000 elections. In contrast, appointed judges (the lower graph in Figure 1) show a very different pattern of reelection. For appointed judges, there was no reelection failure throughout the period. The overall patterns in Figure 1 show that the functioning of the reelection processes is very different under the two systems.

This difference raises three questions that are crucial to understanding these systems: (i) How does the reelection concern affect judges' behavior? (ii) To what extent do reelection outcomes of judges depend on other factors such as judges' age and tenure or voters' party preference? (iii) Are there any differences in the types of judges selected under the two systems? The goal of this study is to answer these three questions. To achieve this goal, we specify and estimate a dynamic model of judges' behavior, using a newly collected data set that combines *rich individual-level data* on judges' criminal sentencing decisions with *detailed information on judges' electoral outcomes, individual characteristics and career profiles* in the State of Kansas.

Several interesting patterns emerge from the data. In Figure 2, we summarize overall patterns of sentencing decisions (jail time) under the two systems, when judges are in conservative and liberal districts. Specifically, the figure shows the relative frequency (%) of five different actions

ratio, which is strongly correlated with the degree of urbanization of the legal profession, it is ranked as 25th among the fifty U.S. states. For details, see Carson (2004).

Figure 2: Distribution of Sentencing Decisions



(H, SH, S, SL, L) in sentencing decisions from the harshest decision (H , the left-most bar in each graph) to the most lenient decision (L , the right-most bar in each graph).⁵ When judges are appointed, sentencing decisions show negligible difference across the political orientations of judicial districts. In contrast, elected judges’ sentencing behavior differs remarkably depending on whether they represent conservative or liberal districts.⁶ In particular, there is a substantial difference in the relative frequency of the most lenient sentencing decision (L). While elected judges in conservative districts make the most lenient decision only 2.8% of the time, elected judges in liberal districts make the most lenient decision 41.3% of the time.

The remarkable difference in sentencing patterns of judges across districts under the two systems indicates that there is a substantial difference in the way that the two systems function. However, the sentencing pattern by itself does not yield a conclusion on whether different *reelection concerns* under the two systems yield different decision patterns or whether different *types* of judges enter the court under the two systems. The two key innovative features of this study are: (i) to establish the quantitative relationship between the sentencing behavior, judges’ characteristics and the probability of reelection; and (ii) to estimate the preference distribution of judges selected

⁵The five decisions H, SH, S, SL, L mean ‘harsh’, ‘standard-harsh’, ‘standard’, ‘standard-lenient’, and ‘lenient’, respectively. Aggregation of raw sentencing decisions into five different actions is based on sentenced jail time. The specific way that the five actions H, SH, S, SL, L are constructed is described in Section 3.3.

⁶The difference in elected judges’ behavior across districts is statistically significant at the 1% level under χ^2 -test.

under the two systems.

Addressing these issues is important for several reasons. First, in cases where reelection probability of judges is mostly explained by other factors such as fluctuations in voters' party preference or judges' age, it would suggest that voters do not care or do not have much information about judges' decisions. In such a situation, judges would not have an incentive to change their court decisions in response to electoral pressure. On the other hand, if reelection outcomes are substantially affected by judges' decisions, judges have strong incentives to change their court decisions to please voters. Thus, understanding the quantitative relationship between reelection outcomes, judges' court decisions, and other factors is essential to understanding the effect of reelection concerns on judges' behavior.

Second, the two systems are different in initial selection processes as well as reelection processes. If the two initial selection processes yield different types of judges, they would generate different patterns of judges' court decisions. And, even in the case that the competitive election impose the same degree of accountability on judges' behavior, we may observe a substantial difference in their behavior and in reelection failure rates.

In the model we develop in this paper, a judge makes: (i) criminal sentencing decisions, considering both their effect on his reelection probability and his own preference over sentencing, and (ii) exit decisions from the bench, considering the payoff from his outside options, the payoff from the seat on the bench, and his reelection prospects. We estimate the model using simulated maximum likelihood, with data for 243 state district court judges who entered the court since 1976.

Our dynamic framework enables us to address two main issues that arise in analyzing the relationship between judges' decisions and reelection probability. The first issue is endogeneity of their sentencing decisions. When judges make sentencing decisions, they anticipate that their decisions may affect the likelihood of reelection. In modeling judges' sentencing decisions, we incorporate details of judges' career history into their out-of-bench payoff. Judges' detailed career history is the information that is costly for voters to acquire, hence it is unlikely to affect reelection probability. However, judges with different career histories have different potential out-of-bench

payoffs, which in turn generates variation in judges' stake in reelection. That is, it generates variation in each judge's incentives to appeal to voters with their court decisions. This innovative feature, which is based on our new data on judges' career history, addresses the endogeneity of sentencing decisions. Thus, we can consistently estimate the relationship between judges' reelection probability and their sentencing decisions. Second, by explicitly incorporating judges' exit decisions in our model, we address the potential selection bias in reelection probability that can be caused by judges' endogenous choice to run for reelection.⁷

Further, our framework is not only useful for analyzing the subject of this paper, but it can also be applied to a wide range of issues that involve both selection and incentive problems of public officials.

Our main findings are as follows. First, the sentencing behavior of elected judges is an important determinant of their reelection. However, the extent and the direction of the effect differ substantially depending on the political orientation of their constituencies. When an elected judge is in a conservative district, lenient sentencing decisions are severely punished by the voters, substantially reducing the chances of reelection. In contrast, when an elected judge is in a liberal district, lenient decisions are preferred, and the effect of sentencing decisions on reelection is smaller than in conservative districts.

Second, the party affiliation and the political climate during an election significantly affect the reelection probability of the elected judges. The effects are asymmetric across the parties and the political climates, with Republican judges being considerably more vulnerable to fluctuations in political climate.

Lastly, our estimates suggest that the appointed judges are more homogeneous than the elected judges with respect to their preferences over sentencing decisions. The distribution of appointed judges' preference is highly concentrated around the standard (i.e., middle) preference, while that of elected judges shows substantial dispersion.

Using the estimated model, we conduct two counterfactual experiments. In the first experiment, we consider a scenario where elected judges are life-tenured. The result of our experiment shows

⁷Regarding this second aspect, we follow the approach in Diermeier et al. (2005).

that removing the reelection processes would decrease the frequency of elected judges' lenient decisions in liberal districts approximately by 50%, and increase their frequency in conservative districts. However, even after removing the reelection processes, the distribution of the elected judges' sentencing decisions is very different from that of the appointed judges, because of the difference in their underlying sentencing preferences. In the second experiment, we change the reelection process of appointed judges. That is, we consider a scenario where appointed judges run for competitive reelections. We find that when appointed judges have to run for competitive reelection, they change their sentencing behavior to conform to the preference of the voters in their districts, generating disparity between conservative and liberal districts in sentencing patterns. However, the degree of disparity across districts is much smaller than that generated by the behavior of elected judges running for competitive reelection, because of appointed judges' homogeneity in their sentencing preferences.

1.1 Institutional Background

In this section, we provide an overview of the institutional background of the State of Kansas. There are 160 state district court judgeships in 31 judicial districts in the State of Kansas. Figure 3 shows the geographical distribution of the two systems. Among thirty-one judicial districts, seventeen districts (unshaded region in Figure 3) use the system of appointment and up-or-down vote, and these districts constitute 87 judgeships. On the other hand, in fourteen districts (shaded region in Figure 3), judges are elected, and these districts constitute 73 judgeships.

The two systems have similar distribution of judicial districts in terms of social and political characteristics. First, when we classify judicial districts that have populations larger than 50,000 per county as metropolitan districts, 6 out of 31 judicial districts are metropolitan districts.⁸ Among these six judicial districts, three districts (Districts 3, 7 and 10) have appointed judges, and the other three districts (Districts 18, 27, and 29) have elected judges. Second, when we classify judicial

⁸The judicial districts that are classified as metropolitan districts are as follows: Districts 3 (Shawnee County which contains the capital city Topeka), 7 (Douglas County), 10 (Johnson County), 18 (Sedgwick County, which contains City of Wichita), 27 (Reno County), and 29 (Wyandotte County, which contains Kansas City).

Figure 3: Geographical Distribution of the Two Systems in Kansas

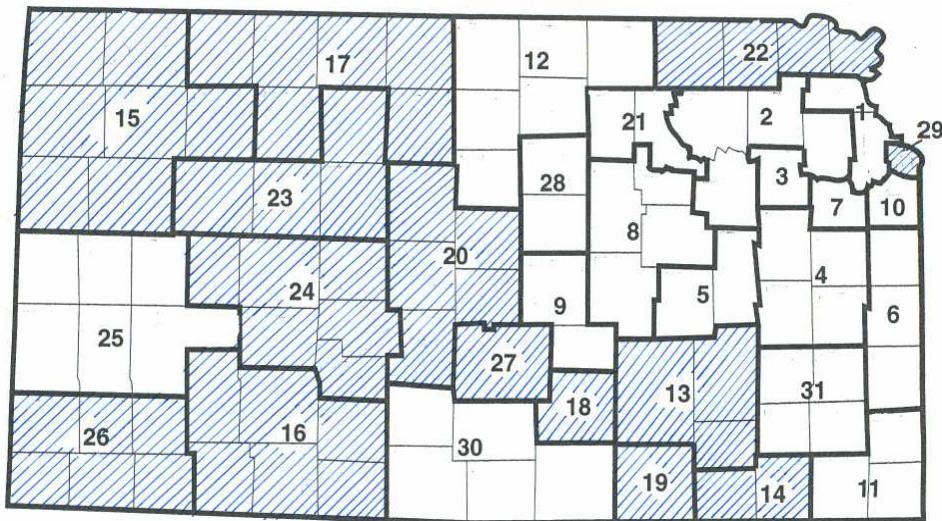


Table 1: Characteristics of the Districts under the Two systems in Kansas

	Appointed	Elected
no. of districts	17	14
no. of judges	87	73
no. of metropolitan districts	3	3
no. of liberal districts	6	5

districts based on political orientation, out of eleven districts that are relatively liberal, six districts have appointed judges and five districts have elected judges.⁹

Under both systems, the term of each district judge is 4 years. As for electoral cycle, fifty-nine percent of the seats are up for election in the same year as the presidential election, and the rest of the seats are up for election in the year of the gubernatorial election, which is staggered with the presidential election.

One of the main tasks that district court judges perform is criminal sentencing¹⁰, which is

⁹Eleven judicial districts that are classified as liberal districts are Districts 1, 3, 5, 6, 7, 11, 18, 19, 23, 27, and 29. The classification of political orientation is based on the normalized vote share of Democratic candidates (i.e., Democratic vote share / (Democratic + Republican vote share)) in gubernatorial and presidential elections from 1950 to 2006. Specifically, in the liberal districts, the average normalized vote share of Democratic candidates is larger than 49% in gubernatorial elections and larger than 38% in presidential elections. (Since Kansas is favorable to the Republican party in national politics, there is a discrepancy between the criteria of vote share from the gubernatorial election (state politics) and the presidential election (national politics), but the two criteria yield identical classification results.)

¹⁰Among the 45.4 million non-traffic cases entering state courts in 2004, nearly half (20.7 million) were criminal

guided by the Kansas Criminal Sentencing Guidelines. Under the guidelines, criminal cases are categorized based on the defendant's criminal history and the severity of offenses. The guidelines specify the maximum, standard, and minimum jail time for each category of case characteristics. Once a defendant is convicted, judges have discretion over jail time, which can vary from the specified minimum to maximum jail time. The table of the maximum, standard, and minimum jail time in the sentencing guideline is contained in Section A in the appendix.

1.2 Related Literature

This study contributes to the growing literature of comparing the behavior of non-elected and elected public officials. Recent studies by Alesina and Tabellini (2007, 2008) theoretically analyze what types of policy tasks are better performed by non-elected bureaucrats as opposed to elected politicians, focusing on the reelection concerns that politicians have.¹¹ On the other hand, a study by Besley and Coate (2003) focuses on comparing appointment and election as selection procedures. Specifically, they show that selecting regulators through election as opposed to appointment leads to issue-unbundling and leads to selecting the types of regulators who will conform to voters' preferences. One of the major innovations of this paper is to propose an econometric framework that can specifically quantify the strength of reelection concerns and jointly estimate the underlying preference types of politicians, which were primarily analyzed in the theoretical literature.

There has also been a long tradition of economic research analyzing judges' political roles or career motives, from the seminal papers by Landes and Posner (1975) and Posner (1993) to the recent theoretical study by Levy (2005).¹² The research in this tradition has typically been focused on one of the three following dimensions: (a) modeling strategic aspects of the interaction between the judicial branch and other branches of government (e.g., Landes and Posner (1975), Spiller and Gely (1990, 1992)), (b) assessing the effect of judges' background on their decisions (e.g.,

cases. See National Center for State Courts (2004). It has also been well documented that criminal sentencing is regarded as one of the most important issue areas in the judicial elections. For details, see Goldberg et al. (2002).

¹¹Also see Maskin and Tirole (2004) and Canes-Wrone and Shotts (2007) for other theoretical analyses related to this issue.

¹²For other research about judges, also see Iaryczower et al. (2002), Spiller and Bergh (2003), I Vidal and Leaver (2005), Yoon (2006), Boylan (2006), Spiller and Gely (2007), and Abrams and Bertrand (2007).

Ashenfelter et al. (1995)) and (c) understanding judges' career concerns (e.g., Posner (1993), Levy (2005)). One of the major innovations of our research is to specify a unified empirical framework in which judges' decisions interact with their long-term career concerns, political environments and judges' backgrounds. By incorporating three factors together in one framework and connecting these factors jointly to data, we can assess the importance of these factors in judges' decisions.

There is also a sizable literature that analyzes the politico-economic causes and effects of judicial selection mechanisms. Recent research by Hanssen (2004a, 2004b) clarifies how politico-economic instability affects the change of the judicial selection rules. He finds that political instability may lead states to adopt systems that appoint judges as opposed to systems that elect judges. His finding motivates the question of how different the types of selected judges are under the two systems and how the turnover of judges is determined, both of which are answered in our analysis. There are also several studies that are directly related to the variables we focus on in our analysis. For instance, Hall (2001) focuses on systematic statistical investigation of judicial elections, specifically the overall rate of incumbent judges being challenged and defeated, and the average vote share. Her analysis provides a good understanding of the electoral vulnerability of judges under various systems. However, if we focus only on the statistics of reelection outcomes and do not connect them to individual judges' decisions and characteristics, it is unclear what drives the difference in reelection rates under different systems. And, it is necessary to establish the exact quantitative relationship between judges' behavior, characteristics and their reelection, in order to crystallize our understanding of reelection procedures.

There have also been numerous efforts to document the impact of judicial selection mechanisms on judges' behavior. For example, Besley and Payne (2003) investigate the empirical difference in filings of employment discrimination charges under various judicial selection mechanisms. Further, Bohn and Inman (1996) find that states with elected judges are more likely to have a balanced budget. On the other hand, Huber and Gordon (2007) document the difference between appointed and elected judges in Kansas in terms of their criminal sentencing behavior, and find that both the probability of incarceration and the average jail time sentenced are slightly higher in aggregate

when judges are elected.¹³ (For research about judges decisions in other areas, see Hall (1992, 1995), Brace and Hall (1997), Brace et al. (1999), Hanssen (1999, 2000), Blume and Eisenberg (1999), Tabarrok and Helland (1999), Romero et al. (2002), and Gelman et al. (2004).)

These studies about judicial selection mechanisms have substantially improved our understanding of the systems. However, they do not estimate the relationship between judges' decisions and reelection probability. Such an analysis has not been conducted to date because of the paucity of information on judges' characteristics and career profiles, which may in turn affect their turnover or their decision-making in courts.¹⁴ A major innovation of this study is to address this issue by jointly estimating the preference of judges and reelection probability with our new data on individual judges' reelections, characteristics and career histories.

The rest of the paper is organized in the following order. In the next section, we specify the model. Then, we describe our data in Section 3. In Section 5, we summarize the estimation results. In Section 6, we discuss our counterfactual experiments, and we conclude in Section 7.

2 Model

We consider a finite-horizon dynamic model of judges' decisions after entering the bench. The length of a period is two years.¹⁵ We assume that the earliest age when a judge can enter the bench is 29, and if he stays on the bench to the age of 75, he must leave the bench at that point.¹⁶

¹³There are three major differences between the analysis in Huber and Gordon (2007) and our analysis. First, we focus on how difference in sentencing patterns across districts are different under the two systems. That is, we focus on the difference-in-differences in judges' decision patterns under the two systems rather than overall differences. Second, we explicitly connect judges' sentencing decisions to reelection by adding data on reelections and judges' decisions to run for reelection. Lastly, our analysis is done at the individual-level in a dynamic perspective. Reelection concerns vary across individual judges and across time through party affiliation, political climate during elections, and payoffs from outside options.

¹⁴The obstacle caused by the paucity of such information has been discussed in other studies about judges. For example, see the discussion in page 166 of the study by Yoon (2006).

¹⁵Note that one term of a judge consists of two periods. We assumed that one period is two years for two reasons. First, in our data, we observe 40% of the voluntary exits in the middle of a term. Second, it allows for the possibility that the effect of sentencing decisions in an early point of a term can be different from that in a later point of a term and that judges will change their sentencing patterns within a term, as they get close to reelection.

¹⁶Age 29 is the youngest age observed in our data, and age 75 is the mandatory retirement age for district court judges in Kansas. In terms of legal credentials, candidates for Kansas state district court judgeships are required to have a minimum of 5 years' experience in the state bar.

A judge makes two different decisions every period. At the beginning of each period, a judge

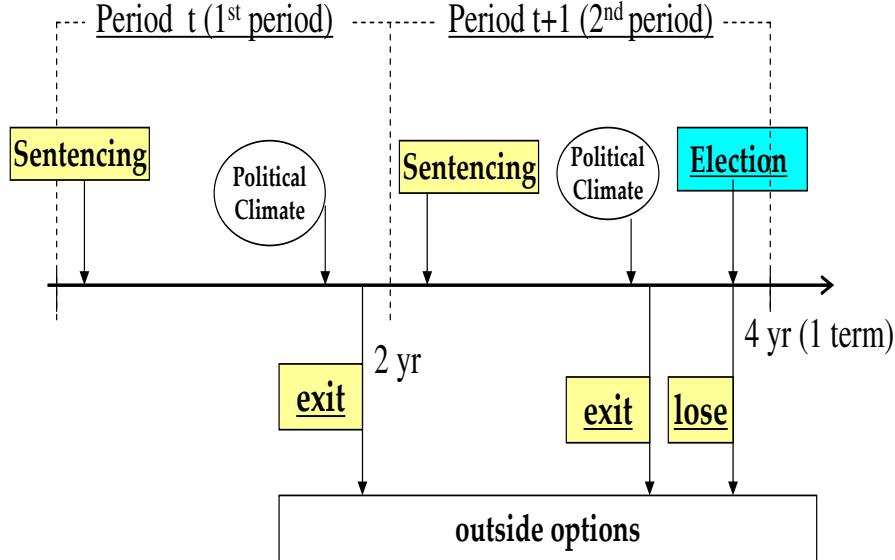


Figure 4: Timing of Events

makes his sentencing decision $p_{it} \in \{H, SH, S, SL, L\}$, where H denotes the harshest decision and L denotes the most lenient one.¹⁷ When he makes sentencing decisions, he considers his own preference over sentencing and the effect of sentencing decisions on his reelection prospects. At the end of each period, he observes voters' preference over parties ("political climate"). And, he makes a decision $c_{it} \in \{Stay, Exit\}$ whether to (i) stay on the bench and run for reelection when the seat is up for reelection ($c_{it} = Stay$) or (ii) exit voluntarily from the bench ($c_{it} = Exit$). If a judge exits from the bench (either voluntarily or by defeat in a reelection), he can choose to have an outside legal job, or choose to retire.¹⁸ In making exit decisions, he compares his long-term payoff from the seat on the bench, and his payoff from outside options. When a judge decides to run for reelection, he has to incur the cost of running, denoted by α_R . The timing of events is illustrated in Figure 4.

¹⁷The meaning of the five decisions H, SH, S, SL, L was introduced earlier in footnote 5.

¹⁸There is another way that the employment of judges in the district court is terminated, which is the promotion to higher courts. There is only a small number of observations of promotion (see Section D.1 in the appendix), and age was the only variable that was related to the promotion probability. Hence, we simply regard that the promotion is a function of judges' age, and incorporate the observed probability of promotion and the payoff from high courts α_H into the dynamic programming problem. The payoff from high courts α_H is estimated along with other parameters.

Our model has three main components: (i) payoff from the seat on the bench, (ii) reelection probability, and (iii) post-exit (out-of-bench) payoff. After we describe these components in turn, we will specify how judges' sentencing and exit decisions are made.

2.1 Payoff from the Seat on the Bench

The per-period payoff that a judge i derives from his seat on the bench in period t consists of three components - (i) a fixed, non-sentencing-related component, (ii) a sentencing-related component, and (iii) the taste shocks $(\zeta_{it}^H, \zeta_{it}^{SH}, \zeta_{it}^S, \zeta_{it}^{SL}, \zeta_{it}^L)$ attached to the sentencing decisions, drawn from the type I extreme value distribution with a scale parameter σ_Z . The payoff that is not related to the sentencing decision is a combination of the wage WB that he earns and the non-pecuniary benefit α_B that he derives from the seat. The sentencing-related component of the payoff, denoted by u , is a function of his preference type T_i and his sentencing decision p_{it} . That is, the per-period payoff from the bench, denoted by $v(T_i, p_{it})$, is

$$v(T_i, p_{it}) = WB + \alpha_B + u(T_i, p_{it}) + \zeta_{it}^P.$$

There are three possible preference types ($T_i \in \{t_1, t_2, t_3\}$) that a judge can have, which are harsh, standard, and lenient types. We allow the distribution to differ not only across systems, but also across parties. That is, we have four different distributions of preference types, based on whether judges are elected or appointed and their party affiliation. The functional form of the payoff $u(T_i, p_{it})$ that a judge of each type T_i derives from his decision $p_{it} \in \{H, SH, S, SL, L\}$ is specified in Appendix B.¹⁹

As stated above, when a judge makes a sentencing decision, he not only considers its effect on his utility in the current period, but he also considers its effect on his entire career, taking into account the fact that his decision may affect his reelection probability.

¹⁹There are also judgeships in which judges do not make any sentencing decisions throughout, and we classify these seats as ‘non-crime seats’. The non-crime-seat judges are typically specialized in handling administrative issues (i.e., they are ‘administrative judges’). For these judges, we assume that they get an additional fixed payoff α_{NC} , and it replaces $u(T_i, p_{it})$. α_{NC} is estimated along with other parameters of the model.

2.2 Reelection Probability

Since the two systems have different reelection processes, we specify the reelection probability differently for appointed and elected judges. For appointed judges, we regard that they get reelected with probability 1.²⁰ On the other hand, the reelection probability of elected judges is modeled as Probit. The set of state variables that affect reelection probability are as follows.

The first two state variables that affect the reelection probability are two sentencing decisions ($p_{i,t-1}$ and p_{it}) that a judge makes in a term. We assume that voters take into account only the judge's behavior in a term (the two periods) immediately prior to an election. That is, once a judge is re-elected to the seat, only the sentencing decisions in the new term affect the re-election probability in the next election.²¹ As described above (footnote 19), there are also judgeships in which judges do not make any sentencing decisions ("non-crime seat"). We use a dummy variable ($Noncrime_i$) that has value 1 when the judge belongs to the non-crime seat.

The next set of variables are individual-level characteristics. These are the age (Age_{it}) and the tenure of a judge on the bench ($Tenure_{it}$) counted as the number of periods served.

The last set of state variables pertain to political factors. The first political variable is judges' party affiliation, which is either Democrat or Republican ($Party_i \in \{D, R\}$). Additionally, there are two district-level political variables, which are the political orientation of districts and the political climate. The political orientation of districts can be either conservative or liberal ($Dist_i \in \{Con, Lib\}$) and is constant over time. It captures voters' *long-term* preference over *criminal sentencing*.²² On the other hand, the political climate SOD_{it} ('state-of-the-district') captures voters' *short-term* preference over *parties*.²³ The political climate SOD_{it} can have three values

²⁰We make this assumption for the following reasons. First, based on Figure 1, it is a realistic assumption. Second, in the previous version of this paper, we *estimated* the reelection probability function of appointed judges using the distribution of vote share and the theoretical relationship between reelection probability and vote share based on the probabilistic voting model. Such a model gave the same results as a model in which the reelection probability of appointed judges is set to be 1.

²¹This assumption simplifies the state space of our model substantially. At the same time, it is close to the reality, since voters are often alleged to have 'short memory' about politicians' behavior.

²²The classification criterion is described in footnote 9 in Section 1.

²³The rationale for separating the long-term political orientation of districts and short-term political climate is as follows. When there is a nation-wide or state-wide issue that affects the overall popularity of the two parties, the election of local (district-level) offices can also be affected. For example, the skepticism about George W. Bush's war on Iraq affected the overall popularity of Republicans in the 2006 elections. Hence, we need to incorporate this factor

$(SOD_{it} \in \{1, 2, 3\})$, which are ‘favorable to Republicans’, ‘neutral’, ‘favorable to Democrats’, respectively.²⁴ The political climate SOD_{it} evolves stochastically over time, following a Markov process.

We denote the vector of state variables that affect the reelection probability by XR_{it} . That is,

$$XR_{it} = (p_{i,t-1}, p_{it}, Noncrime_i, Age_{it}, Tenure_{it}, Party_i, Dist_i, SOD_{it}).$$

Reelection outcome of elected judges is determined by the combination of a latent variable, which is a function of the state vector XR_{it} , and an electoral shock. Specifically, given a judge’s state vector XR_{it} , the reelection probability of the elected judge, denoted by $WINP^{EL}$, is

$$WINP^{EL} = \Pr\{Ind_{Eit} \geq 0\} = \Phi(Ind_E(XR_{it})) \quad (1)$$

in which

$$Ind_{Eit} = Ind_E(XR_{it}) + \eta_{Eit},$$

$$\eta_{Eit} \sim N(0, 1),$$

and $\Phi(\cdot)$ is the cumulative distribution function of the standard normal distribution. The latent variable $Ind_E(XR_{it})$ can be divided to three components.

$$\begin{aligned} Ind_E(XR_{it}) &= Ind1_E(p_{it}, p_{i,t-1}, Dist_i, Party_i, Noncrime_i) \\ &\quad + Ind2_E(Age_{it}, Tenure_{it}) + Ind3_E(Party_i, SOD_{it}) \end{aligned}$$

The first part ($Ind1_E$) pertains to the effect of sentencing decisions (p_{it} and $p_{i,t-1}$). We allow

in the voters’ preference over parties. However, such an issue would not have a meaningful effect on voters’ preference over judges’ criminal sentencing. Hence, we use a short-term measure ‘political climate’ for preference over parties and long-term measure ‘political orientation of districts’ for voters’ preference over sentencing.

²⁴We measure SOD_{it} by the normalized vote share of Democratic candidates in the presidential and gubernatorial elections, which is a measure *ex-post* observed by the econometrician. The political climate is measured election by election, while the political orientation of districts is based on the average vote share throughout the period.

for the possibility that preference of voters over sentencing in the liberal districts ($Dist_i = Lib$) can differ from that in the conservative districts ($Dist_i = Con$). Additionally, voters may have different prior views about judges from different parties, which affects the marginal effect of sentencing decisions. Hence, we also allow sentencing decisions to have different effects depending on judges' party affiliation ($Party_i$). Since sentencing decisions are relevant only when judges are in seats that have been assigned criminal cases, we interact the effect of sentencing-decisions with the dummy variable, $Noncrime_i$. The second part of the latent variable ($Ind2_E$) is composed of judges' individual-level characteristics - Age_{it} and $Tenure_{it}$. The third part ($Ind3_E$) pertains to the fluctuation of voters' preference over parties. The party affiliation, $Party_i$, is interacted with the political climate, SOD_{it} . (The exact specification of the latent variable $Ind_E(XR_{it})$ is in Section C in the appendix.)

2.3 Post-exit Decision and Payoff

To define a dynamic programming problem of a judge over his career, we need to specify the value of exiting from the bench. A judge's choice and payoff that follow after leaving the bench are as follows. A judge can choose to (i) retire ($d_{it} = 1$) or (ii) have a full-time legal occupation ($d_{it} = 2$).

When he chooses to work, his wage depends on his experience in private law practice before he entered the bench.²⁵ We specify a group of dummy variables ($Expriv1$, $Expriv2$, $Expriv3$) for judges' experience prior to their tenure in the bench as follows.

$$Expriv1 = \begin{cases} 1 & , \text{if } 1 \leq \text{no. of years in private practice} \leq 5 \\ 0 & , \text{otherwise} \end{cases}$$

$$Expriv2 = \begin{cases} 1 & , \text{if } 6 \leq \text{no. of years in private practice} \leq 10 \\ 0 & , \text{otherwise} \end{cases}$$

²⁵Judges also have variation in their length of experience in the public law office before their entry to the court, and variation in the length of tenure as a judge at the point at which they exit. We excluded these variables from the wage equation, since they were not important predictors of former judges' income in our data.

$$Expriv3 = \begin{cases} 1 & , \text{if no. of years in private practice } \geq 11 \\ 0 & , \text{otherwise} \end{cases} .$$

The post-exit wage W_i of a judge with state vector $(Expriv1_i, Expriv2_i, Expriv3_i)$ is determined as follows.

$$\ln W_i = \beta_0 + \beta_1 \cdot Expriv1_i + \beta_2 \cdot Expriv2_i + \beta_3 \cdot Expriv3_i + \varepsilon_i^W$$

in which

$$\varepsilon_i^W \sim N(0, \sigma_W^2).$$

If he chooses to retire, he enjoys the value of leisure denoted by α_L . On top of the post-exit wage or the value of leisure, a former judge can receive a pension. In Kansas, eligibility is determined by age and tenure. Additionally, the pension amount is determined by cohort (the time of entry to the court) and tenure.²⁶ When one solves a dynamic programming problem over his lifetime, he discounts future payoff with discount factor δ ,²⁷ and he also takes into account his probability of death at each age, denoted by $\pi_d(Age)$, as well as the probability that he will eventually retire from his post-exit occupation, denoted by $\pi_r(Age)$.²⁸

The per-period payoff and the present discounted value after the exit are summarized as follows. In case one chooses to retire, the per-period payoff denoted by UR_{it} is

$$UR_{it} = \alpha_L + \text{Pension}(Age_{it}, Tenure_{it}, Cohort_i),$$

and the present discounted value of complete retirement VR_{it} is

$$VR_{it} = \sum_{\tau=t}^{\tau=T} [\delta^{\tau-t} \Pi_{s=t}^{s=\tau} (1 - \pi_d(Age_{is})) \cdot UR_{i\tau}].$$

²⁶The pension rule is specified in Kansas state statute chapter 20 - article 26 (20-2610).

²⁷We use $\delta = 0.90$ for two-year period in the estimation.

²⁸As for the probability of death, we use the observed death rate at each age from the mortality data of the National Vital Statistics System. Regarding the retirement probability from the post-exit job, we parameterize it as a logistic function of age and use the estimated parameter values from Diermeier et al. (2005).

In case that one chooses to work, the per-period payoff, denoted by UW_{it} , is

$$UW_{it} = W_i + \text{Pension}(Age_{it}, Tenure_{it}, Cohort_i),$$

and the present discounted value VW_{it} is

$$\begin{aligned} VW_{it} = & \sum_{\tau=t}^{\tau=T} [\delta^{\tau-t} \Pi_{s=t}^{s=\tau} (1 - \pi_d(Age_{is})) \times \\ & \{ \Pi_{s=t}^{s=\tau} (1 - \pi_r(Age_{is})) \cdot UW_{i\tau} + (1 - \Pi_{s=t}^{s=\tau} (1 - \pi_r(Age_{is}))) UR_{i\tau} \}]. \end{aligned}$$

Now, let us denote the vector of state variables that affect the post-exit payoff by XE_{it} . For judge i with state vector

$$XE_{it} = (Age_{it}, Tenure_{it}, Cohort_i, Expriv1_i, Expriv2_i, Expriv3_i), \quad (2)$$

the present discounted value of exit, denoted by $VE(XE_{it})$, is

$$\begin{aligned} VE(XE_{it}) &= E_{\varepsilon} E_{\xi} \max \{ VR(XE_{it}) + \xi_{1it}, VW(XE_{it}, \varepsilon_i^w) + \xi_{2it} \} \\ &= \int \sigma_S \ln (\exp(VR(XE_{it})/\sigma_S) + \exp(VW(XE_{it}, \varepsilon_i^w)/\sigma_S)) dF(\varepsilon^W), \end{aligned}$$

in which ξ_{1it} and ξ_{2it} are drawn from the type I extreme value distribution with scale parameter σ_S .

In Table 2, we summarize the specification of payoff and elected judges' reelection probability function by showing whether each state variable is an argument of those functions or not.

2.4 Identification

As we noted in the introduction, there have not been empirical studies that quantify the degree of public officials' reelection concerns by estimating the reelection probability function. In conducting such an analysis, a major challenge is the identification problem posed by the endogeneity of their behavior in the office. In our analysis, we address this issue by incorporating each judge's

Table 2: Summary – Specification of Payoff and Elected Judges’ Reelection Probability

State Variable	Per-period Payoff from the bench	Reelection Probability	Out-of-bench payoff
Preference Type	yes	no	no
Sentencing Decision	yes	yes	no
Age	no	yes	yes
Tenure	no	yes	yes
Cohort	no	no	yes
Party	no	yes	no
District’s Political Orientation	no	yes	no
Political Climate	no	yes	no
Pre-entry Career Details	no	no	yes

potential stream of outside payoff in his decision problem in every period. Specifically, the outside payoff provide sources of identification through two different channels. First, it contains our newly collected instrumental variable, which is judges’ career history²⁹, in the wage from out-of-bench legal occupation. Second, it also contains two variables, age and tenure, which vary over time and affect the eligibility and the amount of pension. The complex functional form of pension, in conjunction with cohort which does not enter the reelection probability function, helps identifying the reelection probability function.

Another issue concerns the identification of the payoff from the seat and the utility function parameters. The identification of the non-pecuniary benefit α_B hinges on three elements: wage from the seat, prospect of the outside payoff, and patterns of exit decisions. The wage from the seat on the bench is given, and the prospect of the outside payoff is derived from the post-exit wage equation, pension rule, and each judge’s career history. These elements together determine one’s streams of *monetary* payoff from the seat on the bench and from the outside options. And, the dis-

²⁹The specific aspect of the career history that is used as an instrument is the public/private composition of their professional experience, or equivalently the number of years spent in private practice. Since the specific composition of judicial candidates’ history is not usually publicly available, it is unlikely to affect their reelection probability. However, it affects their wage level from the legal occupation through low mobility between public sector of legal occupation (such as district attorney) and private practice. The low mobility between private and public sectors of legal occupation has been well-documented in sociology literature. For example, see Heinz et al. (2005). Age and tenure on the bench, the variables that tend to be more commonly available to the voters, are included in the reelection probability.

crepancy between the pattern of exit decisions in the data and that predicted from the two different streams of *monetary* payoff is attributed to the non-pecuniary (i.e., “psychological”) payoff from the seat on the bench.

Once the non-pecuniary payoff from the seat is identified, the utility function parameters are identified from the combination of three different elements: reelection probability function, stream of the outside payoff, and stream of payoff from the seat (gross of pecuniary and non-pecuniary payoffs). The difference between the two streams of payoffs define the “size of the stake” in the reelection of each judge, in dollar term. Since the reelection probability is a function of judges’ decisions in the court, the impact of each court decision on one’s long-term payoff can be derived from the reelection probability function and the stake in the reelection. The parameters of the utility function are identified from the difference between the pattern of court decisions predicted purely by the long-term value of each decision and the pattern observed in the data. Since the non-pecuniary payoff unrelated to sentencing decisions is already included in the payoff from the seat, the payoff from one’s most preferred sentencing decision is normalized to be 0.

Finally, consider the identification of judges’ sentencing preferences. For normalization, we define harsh type as one whose most preferred sentencing is the maximum jail time, and lenient type as one whose most preferred sentencing is the minimum allowed by the law. The preference type of judges is identified from the decision patterns when their reelection concerns are relatively small, i.e., when the reelection probability is high or the stake in the reelection is small (hence the marginal effect of sentencing decisions on the long-term payoff is small). Now, let us consider the identification of the bliss point of standard type. For simplicity, suppose that the reelection probability is symmetric with respect to sentencing decisions, i.e., the impact of harshest decision on the reelection probability is the same as that of the most lenient one. Further, suppose that there is a judge who makes a median decision (neither harsh nor lenient) when his reelection concern is very weak. Because his most preferred decision is not close to the maximum or the minimum sentencing, he would be regarded as standard type in the model. If the frequency of his deviation to lenient decision is higher than to harsh decision, the estimated bliss point of the

standard type would be closer to the minimum than to the maximum sentencing. That is, it is the relative frequency of harsh (H or SH) and lenient (L or SL) sentencing decisions that determines the location of standard type's most preferred decision. And, similar reasoning applies when the reelection probability function is not symmetric. The only difference is that the asymmetry of the reelection probability function is taken into account in locating the bliss point of the standard type.

Our model is solved by backward induction from the last period. In the following sections 2.5 and 2.6, we clarify the state variables and the continuation value of judges' exit and sentencing decisions.

2.5 Exit Decision

We denote the vector of the state variables that affect exit decisions (net of sentencing decisions $p_{i,t-1}$ and p_{it}) by XC_{it} . Given that a judge, when making exit decisions, considers his payoff from outside options, chance of reelection, and payoff from the seat, XC_{it} is a combination of the state variables that affect the value of exit (XE_{it} , specified in (2) on page 18), variables that affect reelection probability, and his preference type, T_i .

$$XC_{it} = (T_i, XE_{it}, Noncrime_i, Party_i, Dist_i, SOD_{it}).$$

2.5.1 Second period of a term: when the seat is up for reelection

Let us first consider the situation in which one is in the second period of a term, i.e., when he is up for reelection. In making exit decisions, a judge compares the value of running, denoted by $VRun$, with the value of voluntary exit VE . The value of running $VRun$ contains three factors: (a) the payoff from running itself α_R , (b) the possibility of losing, which occurs with probability $(1 - WINP)$ and yields the value of outside options $VE(XE_{it})$, and (c) the possibility of winning, which occurs with probability $WINP$ and yields the value of being in the seat VC . Hence, the value

of running (net of the taste shock) is

$$\begin{aligned}
VRun(XC_{it}, p_{it}, p_{i,t-1}) &= \alpha_R + (1 - WINP(XR_{it})) \cdot VE(XE_{it}) \\
&\quad + WINP(XR_{it}) \cdot VC(T_i, XE_{i,t+1}, Noncrime_i, Party_i, \\
&\quad Dist_i, SOD_{it}).^{30}
\end{aligned}$$

The present discounted value evaluated at the end of the second period of a term, before the running decision, is

$$\begin{aligned}
EV(XC_{it}, p_{it}, p_{i,t-1}) &= E_\xi \max\{VRun(XC_{it}, p_{it}, p_{i,t-1}) + \xi_{1it}, VE(XE_{it}) + \xi_{2it}\}, \\
&= \sigma_S \ln\{\exp(VRun(XC_{it}, p_{it}, p_{i,t-1})/\sigma_S) + \exp(VE(XE_{it})/\sigma_S)\}
\end{aligned}$$

in which ξ_{1it} and ξ_{2it} are the taste shocks drawn from type I extreme value distribution with scale parameter σ_S .

2.5.2 First period of a term: when the seat is not up for reelection

If a judge is in the first period of a term, he does not face reelection at the end of the period. Hence, he compares the value of being in the seat and the value of voluntary exit. The continuation value of staying (net of the taste shock), denoted by $VStay$, is

$$VStay(XC_{it}, p_{it}) = VC(T_i, p_{it}, XE_{i,t+1}, Noncrime_i, Party_i, Dist_i, SOD_{it}).$$

The present discounted value evaluated immediately prior to the staying decision is

$$\begin{aligned}
EV(XC_{it}, p_{it}) &= E_\xi \max\{VStay(XC_{it}) + \xi_{1it}, VE(XE_{it}) + \xi_{2it}\}, \\
&= \sigma_S \ln\{\exp(VStay(XC_{it}, p_{it})/\sigma_S) + \exp(VE(XE_{it})/\sigma_S)\}
\end{aligned}$$

³⁰Since SOD is realized at the end of each period, when the continuation value is evaluated at the beginning of period $t + 1$, SOD_{it} is the relevant realization.

where ξ_{1it} and ξ_{2it} are the taste shocks drawn from the type I extreme value distribution with scale parameter σ_S .

2.6 Sentencing Decision

Given the continuation value of staying-running/exit decision, the value of each sentencing decision can be written in a straightforward manner. For a judge with state vector XC_{it} , the continuation value of a sentencing decision $p_{it} = \hat{p}$ is³¹

$$V_{\hat{p}}(XC_{it}) = WB + \alpha_B + u(T_i, \hat{p}) + \delta(1 - \pi_d(Age_{it})) \cdot EV(XC_{it}; p_{it} = \hat{p}).$$

The value of being in the seat on the bench, evaluated at the beginning of a period is

$$VC(T_i, XE_{it}, Noncrime_i, Party_i, Dist_i, SOD_{i,t-1}) = E_{\zeta} \max_{\hat{p} \in \{H, SH, S, SL, L\}} \{V_{\hat{p}}(XC_{it})\}.$$

3 Data

We constructed a data set containing detailed information on 243 Kansas state district court judges who entered office since the 1976 general elections. For judges who left before 2006, we observe their complete tenure on the bench. For judges who stayed on the bench in 2006, the spell is right-censored. Among 243 judges, 116 judges are appointed and 127 judges are elected.

As for the party affiliation, 53.5 percent (62 judges) of appointed judges and 44 percent (56 judges) of elected judges are Democrats and the rest are Republicans. Of the appointed Democrats, 54.8 percent (34 judges) belong to conservative districts and 45.2 percent (28 judges) belong to liberal districts. Of the appointed Republicans, 59.3 percent (32 judges) belong to conservative districts, and 40.7 percent (22 judges) belong to liberal districts. Of the elected Democrats, 21.4 percent (12 judges) belong to conservative districts and 78.6 percent (44 judges) belong to con-

³¹This formula is based on the case in which one is in the first period of a term. When a judge is in the second period of a term, the only difference is that $p_{i,t-1}$ should be included in the state vector.

Table 3: Summary – Judge Composition

Total : 243 judges			
Appointed		Elected	
116 (47.7%)		127 (52.3%)	
Democrat	Republican	Democrat	Republican
62 (53.5%)	54 (46.5%)	56 (44%)	71 (56%)

servative districts. Of the elected Republicans, 43.7 percent (31 judges) belong to conservative districts and 56.3 percent (40 judges) belong to liberal districts. These 243 judges provide 1541

Table 4: Composition of Appointed Judges

Appointed : 116 Judges			
Democrat		Republican	
Conservative district	Liberal district	Conservative district	Liberal district
34 (54.8%)	28 (45.2%)	32 (59.3%)	22 (40.7%)

Table 5: Composition of Elected Judges

Elected : 127 Judges			
Democrat		Republican	
Conservative district	Liberal district	Conservative district	Liberal district
12 (21.4%)	44 (78.6%)	31 (43.7%)	40 (56.3%)

observations of staying-running/exiting decisions.³² The data set that we constructed is divided into four main parts : election data, individual-level characteristics, sentencing behavior, and post-exit outcomes.

³²Details of the exit decisions in our data are summarized in Section D.1 in the appendix.

3.1 Election Outcomes

The election data contains the outcome of judicial elections from 1980 to 2006.³³ For the 243 judges in our sample, we have 722 elections in total (420 for appointed judges and 302 for elected judges). We observe no defeats for appointed judges. We summarize the reelection rate of elected judges under six different combinations of party affiliation and political climate in Table 6. As part

Table 6: Reelection Rate of Elected Judges in the Data

Political Climate	Democrat	Republican
Favorable to Republican	88.9 %	94.4 %
Neutral	91.7 %	97.1 %
Favorable to Democrat	98.2 %	66.7 %

of the election data, we also track two political variables. The first variable is the party affiliation. In case of elected judges, we used the explicit party affiliation of judges as appeared on the ballot. In case of appointed judges, we used the party affiliation of the appointing governor as the party affiliation of the judge.³⁴ For the period of 1976-2006, Kansas had six different governors. Three were Republicans and the other three were Democrats.³⁵

The second variable we construct is the political climate ('state-of-the-district'). As described earlier (footnote 24), the state-of-the-district measure is based on each judicial district's normalized vote share of Democrats in presidential and gubernatorial elections. When there are only Democratic and Republican candidates, the measure is simply based on the vote share of the Democratic candidate. When there is a third candidate, it is based on the Democrat's vote share divided by the sum of Democratic and Republican vote share. We construct the state-of-the-district variables from presidential vote shares and gubernatorial vote shares separately, because the meaning of the state-level Republican and Democratic parties can differ from the meaning of the national ones. However, we kept the frequencies of the three states ('favorable to Republican', 'neutral', and 'fa-

³³Since the earliest entry year of the judges in our data is 1976, the earliest relevant reelection occurred in 1980.

³⁴This way of coding is consistent with the way that judges' party was coded in other studies of judges that do not have explicit party labels. For example, see Yoon (2006).

³⁵During the period of our data, the party affiliation of the governor was Republican (1975-1979) - Democrat (1979-1987) - Republican (1987-1991) - Democrat (1991-1995) - Republican (1995-2003) - and Democrat (2003-).

vorable to Democrat') consistent across the presidential elections and gubernatorial elections. In our data, judges face the three states 'favorable to Republican', 'neutral', and 'favorable to Democrat' for 30.1% , 47.2%, and 22.7% of the time, respectively. The details of the classification and the relative frequency are in Section D.2 in the appendix.

3.2 Individual Judges' Characteristics

The set of individual-level characteristic variables contain each judge's age, tenure on the bench, cohort (entry time), and the pre-entry experience in the private practice of law. The mean entry age is 44.7 years for appointed judges and the standard deviation is 7.3 years; for elected judges, the mean entry age is 46.3 years, and the standard deviation is 8 years. The mean number of periods of tenure on the bench that we observe is 7.2 periods (14.4 years) for the appointed judges and 5.6 periods (11.2 years) for the elected judges. We summarize the overall distribution of the judges' characteristics in Table 7.

Table 7: Distribution of Entry Age, Tenure, Cohort, and Pre-entry Experience

		Appointed		Elected	
		Frequency	Proportion(%)	Frequency	Proportion(%)
Entry Age	Under 40	43	37.07	31	24.41
	41-50	44	37.93	61	48.03
	51-60	26	22.41	27	21.26
	over 60	3	2.59	8	6.30
Observed Length of Tenure	under 10 years	38	32.76	68	53.54
	11 - 20 years	56	48.28	47	37.01
	21 - 30 years	22	18.96	12	9.45
Cohort (Entry time)	before 1987	47	40.52	43	33.86
	after 1987	69	59.48	84	66.14
Number of years in Private Practice ³⁶	0 years	5	4.31	8	6.30
	1-5 years	15	12.93	15	11.81
	6-10 years	19	16.38	29	22.83
	10+ years	77	66.38	75	59.06

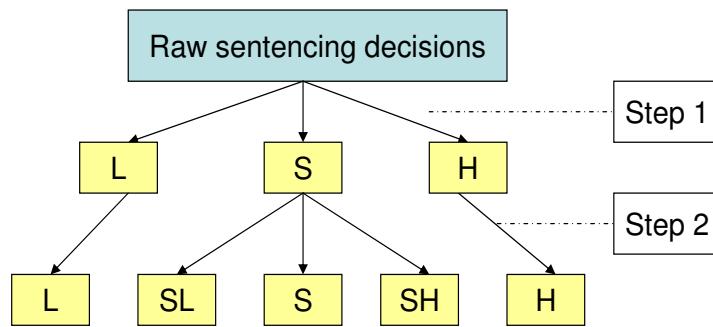
³⁶The relative frequency of the judges who have more than 10 years of private practice experience is disproportionately higher than the other categories. However, we decided not to break down this category, since it did not improve the performance of the model.

3.3 Sentencing Decisions

The data set of the sentencing decisions is created from the raw data that contains all the non-drug³⁷ felony crime sentencing outcomes from mid-1996 to 2006 in Kansas.³⁸ The raw data contains on average of 5690 cases every year. Further, it contains detailed case characteristics about each case such as defendants' criminal history, the primary offense, the severity level of the offense, and the name of the sitting judge. (The details of the raw sentencing data are in Section D.3 in the appendix.)

We construct the aggregate sentencing outcome of each two-year period for each judge. In our data, each judge handles on average 95 cases during each two-year period. The weight of each criminal case used in the aggregation of sentencing decisions is based on the standard prison time of the case specified in the law.³⁹ Since high-profile crimes such as murder and rape have higher standard prison time specified in the law, compared with other offenses, high-profile offenses receive higher weight in the aggregation process. The aggregation of sentencing decisions consists of two steps.

Figure 5: Aggregation of Sentencing Decisions



In the first step, the aggregation of decisions in a judge-period is divided into three categories

³⁷We excluded drug-related cases because voters preference over drug-related issues may not be comparable to voters preference over non-drug cases. For example, debate on criminal sentencing in drug-related cases is much more closely related to racial issues than that in non-drug-related cases. See Boylan (2006) for details. Further, drug-related cases constitute only about 25% of the entire sentencing data. And, judges do not have much variation in their decisions on drug-related crimes. In every severity level of drug-related crimes, more than 75% of the cases result in the same sentencing results. Therefore, excluding drug-related cases does not cause a significant loss of generality.

³⁸Since the district court has original jurisdiction over felony crimes, there is no issue of case selection.

³⁹ Standard prison time is the middle number in each cell of Figure 15 in Section A in the appendix.

(H , S , and L). If the aggregation in the first step results in classification into H or L , no further classification occurs. In the second step, we divide category S to three different sub-categories : SH , S , and SL . In both steps, we track whether the sentenced jail time in each case was minimum, standard, or maximum.⁴⁰

Let us consider the following example (Table 8 and Table 9). Suppose that a judge makes

Table 8: Example : Aggregation of Sentencing Decisions (1st step)

Case	Sentencing			Weight
	L(minimum)	S(standard)	H (maximum)	
A	✓			9
B		✓		66
C			✓	160
D	✓			43
E		✓		140
F	✓			12
Total Score	64	206	160	.
Decision : S(Standard)				

decisions on six cases A, B, C, D, E, and F in a period as follows: A-lenient (i.e., minimum jail time), B-standard, C-harsh (i.e., maximum jail time), D-lenient, E-standard, and F-lenient. Further, suppose that the primary offense of each case yields the standard prison time of 9, 66, 160, 43, 140, and 12 months, respectively. In aggregate, lenient, standard, and harsh decisions receive a total score of 64, 206, and 160 months. Since the standard decision (S) has the highest score, the sentencing outcome in the period is classified as S in this first step. In the second step, we divide class S into three different sub-classes (SL , S , SH) by giving double weights to cases with a high level of severity (the cases that belong to the severity level I ~ V out of ten levels). In our example, S is still the category that receives the highest score in the second step. Hence, the final result of aggregation is S . (If L or H received the highest score in the second step, the final classification result would have been SL or SH , respectively.) As stated above, the judge-period decisions that

⁴⁰As shown in the guideline table in Section A in the appendix, the minimum, standard, and maximum jail times are given in each case, and judges usually sentence one of the three jail times. Judges' deviation from those three options is rare, and the codification into minimum, standard, and maximum is in the raw data, and it is not a judgement made by us.

Table 9: Example : Aggregation of Sentencing Decisions (2nd step)

Case	Sentencing			Weight
	L(minimum)	S(standard)	H (maximum)	
A	✓			9
B		✓		132
C			✓	320
D	✓			43
E		✓		280
F	✓			12
Total Score	64	412	320	.
Decision : S(Standard)				

were classified as H in the first step continue to be classified as H . And, the judge-period decisions that were classified as L in the first step continue to be classified as L in the second step.

Standard prison time is a conventional measure employed in criminology to weight criminal cases of heterogeneous severity. We also tested the robustness of our classification using the Wolfgang-Sellin Index, another traditional measure of severity used in criminology. (See Sellin and Wolfgang (1978) for details.) The classification based on the two different weights gave almost identical results.

The aggregation described above yields 623 judges-periods of sentencing decisions. In Figure 6, we summarize the relative frequency of five sentencing decisions for four different judge groups: appointed Democrats, appointed Republicans, elected Democrats, and elected Republicans. In the

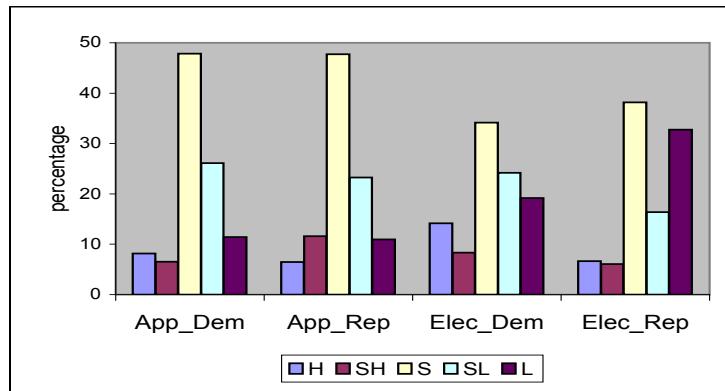


Figure 6: Relative Frequency of the Sentencing Decisions (%)

figure, we observe two notable patterns. The first notable pattern is the proportion of standard decisions (S) across the two systems. When judges are appointed, the relative frequency of standard decisions is substantially higher than that of elected judges, regardless of party affiliation. The difference in the proportion of standard decisions between appointed and elected judges is more than 10 percentage points.⁴¹ The other pattern we observe is the difference across parties. When judges are appointed, there is almost no difference between Democrats and Republicans. In contrast, when judges are elected, there is a non-negligible difference between the two parties.⁴² Moreover, elected Republicans show a relatively more lenient pattern of sentencing decisions than elected Democrats, which may contradict the conventional view about the relationship between parties and attitudes to crime. In Section 5, these patterns will be discussed in conjunction with the reelection concerns that judges from different parties have as well as the distribution of preference types under the two systems.

3.4 Post-exit Outcomes

The last part of the data set is judges' post-exit outcomes. Among 243 judges in the sample, 84 judges exited the court before the year 2006.⁴³ For these judges, we observe whether they exited voluntarily, or they were defeated in the reelection. Sixty-eight judges (31 appointed and 37 elected) left through voluntary exit, and 16 judges (all 16 elected) left through defeat.⁴⁴ Hence, failure in reelection accounts for 19 percent of all the judges who exited during the period, and 30 percent of elected judges who exited. For these 84 judges who exited, we observe whether they worked in another legal occupation (43 judges), or they retired completely (41 judges). In case that a judge took another legal job, we observed the characteristics of the law practice. For former

⁴¹The difference in sentencing decisions between appointed and elected judges is statistically significant at the 1% level under χ^2 -test.

⁴²The difference in sentencing decisions between elected Democrats and Republicans is statistically significant at the 1% level under χ^2 -test.

⁴³Thirteen judges left the district court during this period by being promoted to higher courts. Since their career as judges continue when they are promoted, we do not count these judges as judges who exited.

⁴⁴The overall defeat rate is relatively small in Kansas. However, we identify the parameters of the reelection probability function not only from the actual observations of the defeat, but also from the voluntary exit rates and overall pattern of judges sentencing behavior, which is one of the advantages of our model.

judges who work for public office as prosecutors or county attorneys, we observe their income level directly. For those entering private law practice after exit, we conducted imputation of income based on the observed characteristics such as the size of the practice and the organizational rank, which are important determinants of income from law practice.⁴⁵

4 Solution and Estimation

Our model is solved by backward induction from the last period and estimated with the simulated maximum likelihood. For the construction of the likelihood function, we need the conditional probability of the choices (sentencing decisions and exit decisions) at each state point. We will specify the conditional probability from the last choice (occupation choice after the exit from the bench) to the exit decision and the sentencing decision. Then, we will describe the distribution of unobserved heterogeneity (the electability type and the preference type). In the last part of this section, we will specify the likelihood function.

4.1 Calculating conditional probabilities

Choice probability after exit : As stated in the model, a judge's payoff after the exit from the bench depends on his state vector

$$XE_{it} = (Age_{it}, Tenure_{it}, Cohort_i, Expriv1_i, Expriv2_i, Expriv3_i).$$

An exited judge with state vector XE_{it} observes the realization of the uncertainty ε_i^W in his wage and chooses between the present discounted value of a legal occupation (VW_{it}) and that of complete retirement (VR_{it}). Since he has the taste shock (ξ_{1it}, ξ_{2it}) drawn from type I extreme value distribution with scale parameter σ_S , the conditional probability of complete retirement (as opposed to

⁴⁵The information on judges' post-exit outcomes is mainly based on the Kansas Legal Directory, an exhaustive listing of lawyers published by the Kansas Bar Association. In imputing lawyers' income, we used the results from Heinz et al. (2005) with regional adjustments for billing rates.

taking another legal job) is as follows.

$$\Pr(d_{it} = 1 | XE_{it}) = \int \frac{\exp(VR(XE_{it})/\sigma_S)}{\exp(VR(XE_{it})/\sigma_S) + \exp(VW(XE_{it}, \varepsilon_i^W)/\sigma_S)} dF(\varepsilon^W).$$

Choice probability of an exit decision : When a judge is in the second period of a term, his choice is between running, which yields the continuation value $VR(XC_{it}, p_{it}, p_{i,t-1})$, and voluntarily exiting, which yields the continuation value $VE(XE_{it})$. Given that we have taste shocks (ξ_{1it}, ξ_{2it}) drawn from type I extreme value distribution with scale parameter σ_S , the probability that a judge will choose to run for reelection is

$$\Pr(c_{it} = Stay | XC_{it}, p_{it}, p_{i,t-1}) = \frac{\exp(VRun(XC_{it}, p_{it}, p_{i,t-1})/\sigma_S)}{\exp(VRun(XC_{it}, p_{it}, p_{i,t-1})/\sigma_S) + \exp(VE(XE_{it})/\sigma_S)}.$$

When the judge is in the first period of a term, his choice is between staying, which gives value $VS(XC_{it}, p_{it})$, and exiting, which yields value $VE(XE_{it})$. The probability that the incumbent will choose staying on the bench is as follows.

$$\Pr(c_{it} = Stay | XC_{it}, p_{it}) = \frac{\exp(VStay(XC_{it}, p_{it})/\sigma_S)}{\exp(VStay(XC_{it}, p_{it})/\sigma_S) + \exp(VE(XE_{it})/\sigma_S)}.$$

Choice probability of a sentencing decision : Finally, we calculate the choice probability of sentencing decisions. Recall that the value of a sentencing decision $p_{it} = \hat{p}$, net of the taste shock, is

$$V_{\hat{p}}(XC_{it}) = WB + \alpha_B + u(T_i, \hat{p}) + \delta(1 - \pi_d(Age_{it})) \cdot EV(XC_{it}; p_{it} = \hat{p}).$$

It is straightforward to calculate the choice probability of a sentencing decision $p_{it} = \hat{p}$ as follows⁴⁶

$$\Pr(p_{it} = \hat{p} | XC_{it}) = \frac{\exp(V_{\hat{p}}(XC_{it})/\sigma_Z)}{\sum_p \exp(V_p(XC_{it})/\sigma_Z)}.$$

⁴⁶The formula is based on the case in which one is in the first period of a term. When a judge is in the second period of a term, the only difference is that we include $p_{i,t-1}$ in the state vector.

4.2 Estimation

In this subsection, we specify the likelihood function. We formulate the likelihood contribution of each observation in turn. First, we begin with the observation after exit.

4.2.1 Observation after Exit

Applying the choice probabilities that we specified in Section 4.1, the likelihood of observing choice d_{it} after exit, denoted by L_{it}^E , is

$$\begin{aligned} L_{it}^E &= [\Pr\{d_{it} = 1 | XE_{it}\}]^{I[d_{it}=1]} \\ &\quad \times [\Pr\{d_{it} = 2 | XE_{it}\} \Pr(W_{it} | XE_{it})]^{I[d_{it}=2]}. \end{aligned}$$

4.2.2 Sequence of choices in a given period

Next, we specify the likelihood of the sequence of choices - sentencing decision, exit decision and the choice after exit. Since the probability of exiting from the seat is different depending on whether or not the seat is up for reelection, we specify the likelihood function separately for those two different cases. First, when a judge is in the first period of a term, he initially makes a sentencing decision, and then he makes a staying decision. If he chooses to exit, then we observe the choice after exit.

$$\begin{aligned} L_{it}^1(XC_{it}) &= \Pr\{p_{it} | XC_{it}\} \cdot \Pr(c_{it} = Stay | XC_{it}, p_{it})^{I[c_{it}=Stay]} \cdot \\ &\quad [\Pr\{c_{it} = Exit | XC_{it}, p_{it}\} L_{it}^E]^{I[c_{it}=Exit]}. \end{aligned}$$

Second, if a judge is in the second period of a term, the seat is up for reelection. Hence, we may have another kind of observation, which is the reelection result. Let us denote the reelection result by a dummy variable $Lose_{it}$ ($Lose_{it} = 1$ when a judge loses the reelection bid). Then, the likelihood

contribution of the sequence of choices in a given period is

$$\begin{aligned}
L_{it}^2(XC_{it}, p_{i,t-1}) &= \Pr\{p_{it}|XC_{it}, p_{i,t-1}\} \times [\Pr\{c_{it} = Stay|XC_{it}, p_{i,t-1}, p_{it}\} \cdot \\
&\quad \{(1 - Lose_{it}) \cdot WINP(XR_{it}) + Lose_{it} \cdot (1 - WINP(XR_{it}))L_{it}^E\}]^{I[c_{it}=Stay]} \\
&\quad \times [\Pr\{c_{it} = Exit|XC_{it}, p_{it}, p_{i,t-1}\}L_{it}^E]^{I[c_{it}=Exit]}.
\end{aligned}$$

4.2.3 Likelihood of the Entire Career Observation

So far, we have specified the likelihood of the sequence of observations in a given period of a given preference type, T_i . By combining the sequence of observations and integrating over the possible preference types, the contribution of an individual i who entered in period t_0 and was in the court for t_i periods is

$$L_i = \sum_{T_i} \Pi_{t=t_0}^{t_0+t_i-1} L_{it}(T_i) \cdot \Pr(T_i).$$

Finally, we have

$$L = \Pi_{i=1}^N L_i.$$

5 Results

In this section, we summarize the main empirical findings. We report the results for the following parts: reelection probability, payoff from the seat on the bench and sentencing decisions, and the preference type distribution. After the discussion of our main results, we also report the performance of our model in terms of goodness of fit. The maximum likelihood estimates and standard errors of the model parameters are reported in Section E of the appendix.

5.1 Reelection Probability

The reelection probability of elected judges, a primary focus of our analysis, shows several interesting features.

Party affiliation: For elected judges, an important factor that affects reelection probability is the

combination of party affiliation and political climate. Table 10 summarizes the average reelection probability of elected judges under six different combinations of party affiliation and political climate, based on our estimates. An interesting aspect of the effect of party affiliation on reelection

Table 10: Average Reelection Probability of Elected Judges (Estimated)

Political Climate	Democrat	Republican
Favorable to Republican	90.3 %	93.8 %
Neutral	91.7 %	95.5 %
Favorable to Democrat	98.4 %	70.2 %

probability is the asymmetry between Democrats and Republicans. When a judge is Democrat, the maximum effect of political climate on reelection probability is 8.1 percentage points, while it is more than 20 percentage points when a judge is Republican. Given that Kansas is a deep-red state⁴⁷, the incumbent Democratic judges seem to show very little vulnerability to political climate since they were selected under the state politics generally unfavorable to their party from the beginning.⁴⁸

Sentencing Decision: For elected judges, the effect of sentencing decisions critically depends on the political orientation of the district, i.e., whether a judicial district is conservative or liberal. Not only do voters' preferences over sentencing decisions differ across the political orientation of districts, but the magnitude of the effect also varies. When a judicial district is conservative, the most preferred decision is the standard (S) decision, and the most lenient decision (L) is severely punished. Further, the sentencing decision has a substantial impact on reelection probability. On the other hand, when judges are in a liberal district, the lenient decision (L) is the most preferred, and the harshest decision (H) is the least preferred. And, the magnitude of the effect of sentencing on reelection is much smaller than the case of conservative districts. Table 11 shows the average negative effect on the reelection probability when an elected judge changes his sentencing decision

⁴⁷For presidential elections from 1950 to 2004, the average normalized vote share of Democratic candidates was 39%. Moreover, as of 2008, among 40 Kansas state senators, only 10 senators are Democrats.

⁴⁸Even though there was an asymmetry in political climate classification, it did not contribute to the asymmetry between parties in reelection probability. Even when we classify the political climate in the opposite asymmetric way, elected Democrats show strong stability in reelection across political climates.

Table 11: Impact of Sentencing Decisions on Reelection Probability of the Elected

	Conservative district	Liberal district
Democrat	- 17.0	- 0.0
Republican	- 33.8	- 22.8
(unit : percentage point)		

from the most preferred to the least preferred in the district.

There is also a substantial disparity between Democrats and Republicans in the effect of their sentencing on reelection. In both conservative and liberal districts, the marginal effect of sentencing decisions is larger for Republicans. This seems to be because the Republican party is much larger than the Democratic party in Kansas, which makes voters' initial information about Republicans much less precise than their information about Democrats.⁴⁹ And, the difference in the initial amount of information leads to difference in the sensitivity of voters to judges' decisions.

The sensitivity of elected judges' reelection probability to their court decisions indicate a substantial difference between the two systems in terms of the amount of information that voters have about incumbents. In the up-or-down vote reelection, the lack of explicit challengers may result in the shortage of information that voters have about the incumbents' behavior⁵⁰, while in competitive elections, challengers may help voters to acquire information, by political campaigning. The statistics of campaigning in judicial elections also suggest that voters may have more information about candidates in competitive elections than in up-or-down vote. For example, from 1990 to 2000, 86% of candidates in competitive state supreme court elections raised funds and the candidates who did receive contributions reported an average amount of \$444,792. In contrast, in the up-or-down vote reelection, only 6% of the candidates received any contributions, and those who received contribution reported an average of \$116,568.⁵¹

⁴⁹A simple model in which voters have uncertain information about judges ideology and do Bayesian updating based on judges decision yields a positive relationship between the variance of judges ideology and the magnitude of the effect of judges decision.

⁵⁰Under serious lack of information, a slight degree of voters' risk-aversion may easily lead to a full approval of the incumbent.

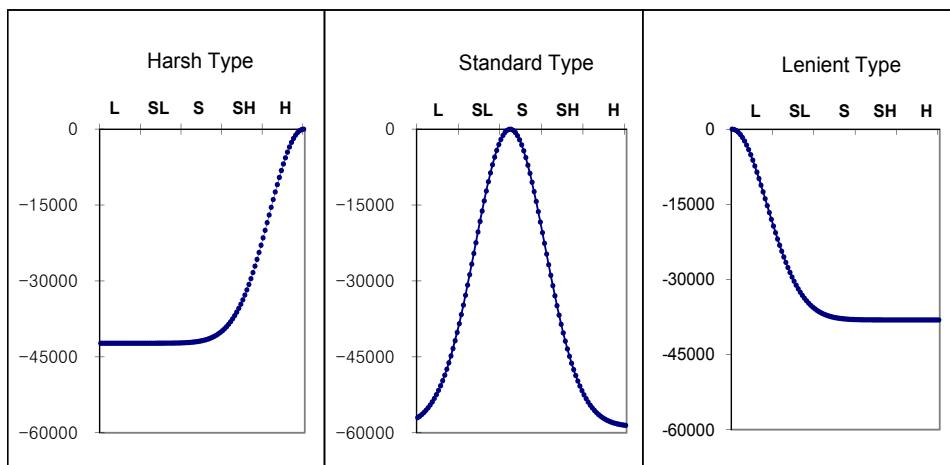
⁵¹See Goldberg et al. (2002) for details.

5.2 Payoff from the Seat on the Bench

In this section, we report our findings related to judges' payoff from the seat. As introduced earlier, the per-period payoff from being on the bench is composed of two different parts. One is the fixed payoff (the sum of wage, WB , and the fixed non-pecuniary payoff, α_B) and the other is the payoff related to sentencing decisions. The estimated non-pecuniary benefit, α_B , which judges get from the seat for a two-year period is \$174,878.⁵² Since judges' wage for a two-year period is around \$200,000, the non-pecuniary benefit is comparable to about 85 percent of the wage.

Regarding sentencing decisions, the payoff for each preference type of judge from each sentencing option (in dollar term) is summarized in Figure 7. The loss of payoff that each preference type incurs by deviating from his most preferred decision varies substantially across types. When a judge is the standard type, he incurs substantial loss of payoff by making decisions that are not standard (S). On the other hand, when a judge is the harsh type or the lenient type, the loss of payoff that he experiences by changing from his most preferred decision to other decisions is smaller than the case of the standard type. The estimated payoff in Figure 7 implies that the standard type of judge cares much about abiding by the law very strictly, while harsh and lenient type have more flexibility in their views on sentencing decisions. Finally, judges bear the cost of running, an

Figure 7: Payoff from Sentencing Decisions for Each Preference Type



amount of \$162277, which includes both the pecuniary and non-pecuniary cost.

⁵²All numbers that are expressed in dollar term in this study are in 2005 US dollar.

5.3 Estimated Preference Type Distribution

One of the main advantages of our econometric framework is that we can estimate the preference type distribution under the two systems. Since the two systems have different initial selection procedures, the estimated type distribution has important implications for the functioning of the two systems. In Figure 8, we show the estimated preference type distribution for four different groups of judges (appointed Democrat, appointed Republican, elected Democrat, and elected Republican). The distribution shows an intriguing aspect. The proportion of the standard preference type is re-

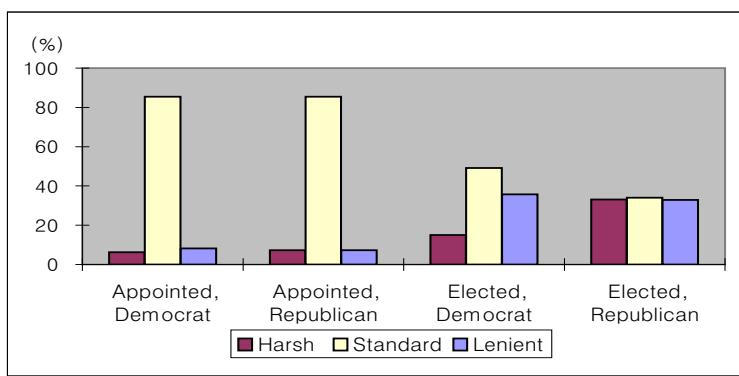


Figure 8: Estimated Preference Type Distribution

markably higher among appointed judges than elected judges, yielding a substantial homogeneity among appointed judges. In contrast, the distribution of elected judges' preference shows much larger variation. This aspect shows a substantial difference in the functioning of the two systems with respect to the initial selection process. Since governors are held accountable by the voters in the entire state, when judges are appointed by the governor, the preference of the median voter in the entire state is reflected in the selection procedure as opposed to the local preference of each judicial district. Hence, the appointment procedure yields a very homogeneous group of judges in terms of sentencing preferences. On the other hand, when judges are elected, the local preference of each judicial district is reflected, which yields substantial disparity in judges' sentencing preferences.

The difference in the estimated preference distribution between the two systems also indicates that the substantial difference in judges' behavior under the two systems, observed in Figure 2 in

Section 1, can be partially attributable to the underlying preference distribution of judges selected under the two systems, as well as the difference in reelection processes. This issue will be discussed in greater detail in Section 6.

5.4 Goodness of Fit

Our model has good performance in fitting the main features of the data. To assess the performance of our model, we compare the main predictions of our model to their empirical counterparts in the following dimensions : (a) the distribution of sentencing decisions when judges are appointed and elected (Figure 9), (b) the distribution of elected judges' sentencing decisions across the political orientation of districts (Figure 10), (c) the distribution of elected judges' sentencing decisions across parties (Figure 11), and (d) voluntary exit rates across age groups for appointed and elected judges (Figure 12).

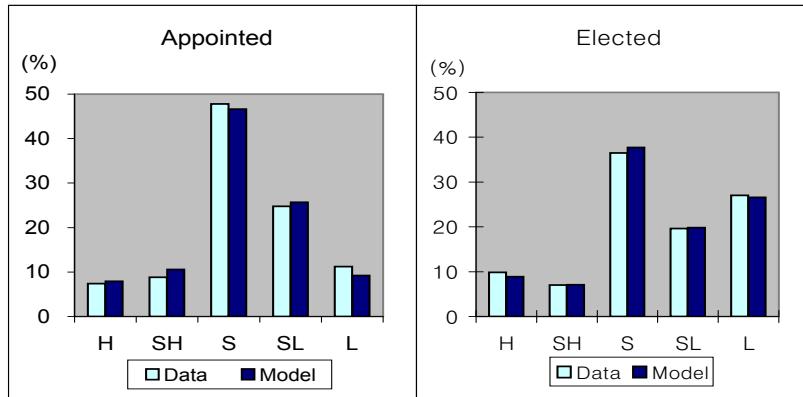


Figure 9: Goodness of Fit – Sentencing Patterns (appointed vs. elected)

Figure 9 shows that our model has good performance in fitting the major patterns of sentencing decisions. Specifically, it predicts the main pattern in the data that appointed judges have much a higher proportion of standard sentencing decision (*S*) than elected judges. Since appointed judges show little variation across parties and political orientation of the constituency (as shown in Figure 2 in Section 1 and Figure 6 in Section 3), in the following part, we will focus on the performance of our model in terms of predicting elected judges' sentencing distribution across parties and districts.

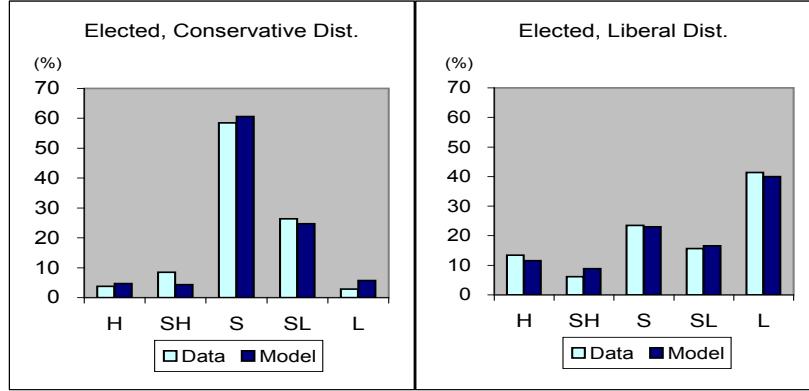


Figure 10: Goodness of Fit – Sentencing Patterns (elected judges, across political orientation of districts)

Figure 10 compares the prediction of our model to its empirical counterpart with respect to elected judges’ sentencing behavior across the political orientation of districts. Our model is able to predict the substantial difference in relative frequency of lenient decisions (*L*) between conservative and liberal districts, which was a focus of our analysis.

The next figure (Figure 11) shows elected judges’ sentencing distribution across parties. Our

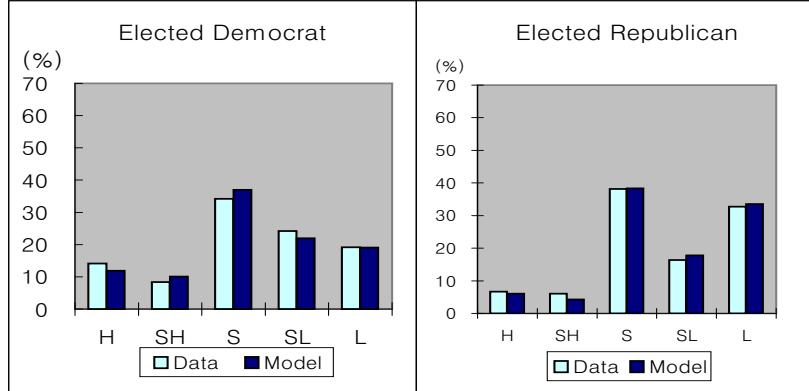


Figure 11: Goodness of Fit – Sentencing Patterns (elected judges, across parties)

model fits the overall difference between the parties fairly well. In particular, it correctly predicts the pattern that Republican judges have a higher proportion of lenient decisions than Democratic judges do (as discussed in Section 3.3).

The next dimension where we evaluate the fit of our model is the exit rate. Figure 12 shows the prediction of the model with respect to the voluntary exit rates of appointed and elected judges

across age groups. A pattern in the data is that the exit rate before the age of 50 is relatively low,

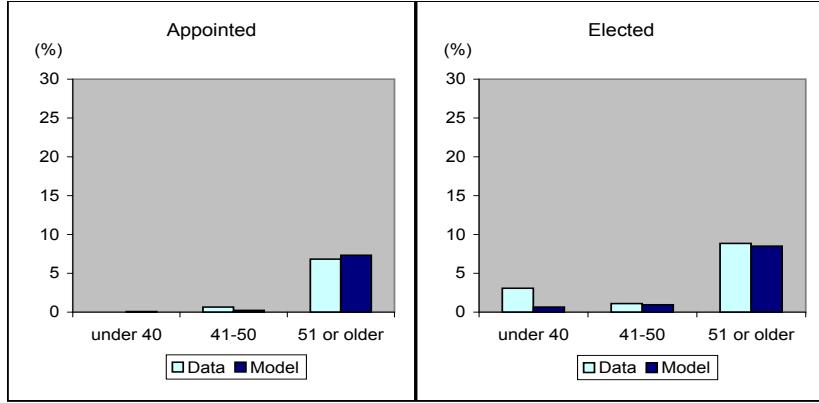


Figure 12: Goodness of Fit – Exit rate by age

and such a pattern is also predicted by the model. In the data, the voluntary exit rate of elected judges is higher than appointed judges for all age groups, which is also predicted by our model.

6 Counterfactual Experiment

One good feature of our econometric framework is that we can conduct counterfactual experiments with the estimated model. In the following section, we introduce the purpose of the experiments and discuss the results.

6.1 Removal of the Reelection (Life-Tenure)

Since one of our primary objectives of analysis is to assess the effect of the reelection on judges' sentencing behavior, we first conduct a simulation in which we remove reelection concerns by giving life-tenure to elected judges. This experiment is not only useful for assessing the influence of reelection concerns on judges' behavior under the current systems, but it also has a concrete implication on change of the institutions. There has been a long debate about making judges more independent from political pressure.⁵³ And, life-tenure is widely used to shield judges from po-

⁵³For example, see <http://www.abanet.org/judind/home.html> for the American Bar Association's discussion about this issue.

litical forces. (For example, judges in the U.S. *federal* courts are life-tenured.) Our simulation suggests how current judges would be likely to behave should they receive life-tenure. Results are presented in Figure 13. The removal of reelection has a substantial impact on elected judges’

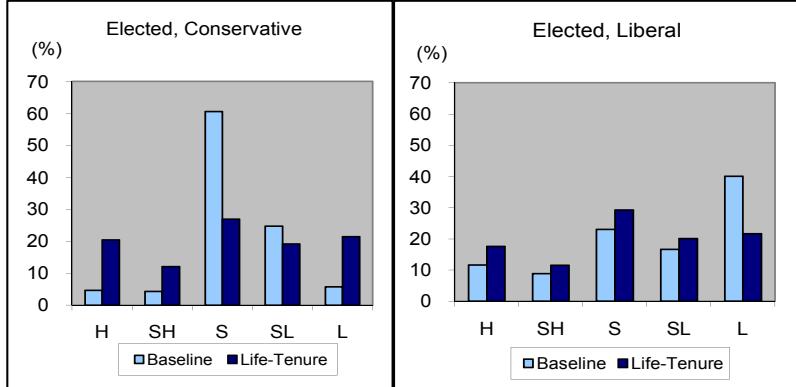


Figure 13: Experiment – Removal of the Reelection (elected judges)

behavior. For elected judges in conservative districts, it substantially increases the proportion of lenient decisions (*L*). When elected judges are in liberal districts, giving life-tenure decreases the proportion of lenient decisions (*L*) by half. This counterfactual experiment confirms our interpretation that the reelection concern has a substantial impact on the behavior of elected judges.

Another notable feature of the result is that even after removing the reelection concern, there is a substantial difference between appointed and elected judges’ sentencing behavior in terms of variation. (Compare Figure 13 with Figure 2 in page 4.) With no reelection concern, appointed judges make standard sentencing decisions (*S*) 49% of the time, while elected judges do only 28% of the time. Hence, even though the reelection concern plays an important role in the difference in elected judges’ behavior across conservative and liberal districts, the overall differences in elected judges’ behavior can be substantially attributed to the underlying preference distribution (i.e., the initial selection).

6.2 Change of Reelection Processes

In the next counterfactual experiment, we let appointed judges face the competitive reelection process. Through our counterfactual experiment, we assess how the currently-sitting appointed

judges' behavior would change when the system changes from up-or-down vote to competitive reelection. The results are summarized in Figure 14.

When the appointed judges face a competitive reelection process (Figure 14), it creates a disparity between conservative and liberal districts that they did not have under the up-or-down vote. It decreases the proportion of lenient decisions (L) from 9.6% to 1.4% in conservative districts.

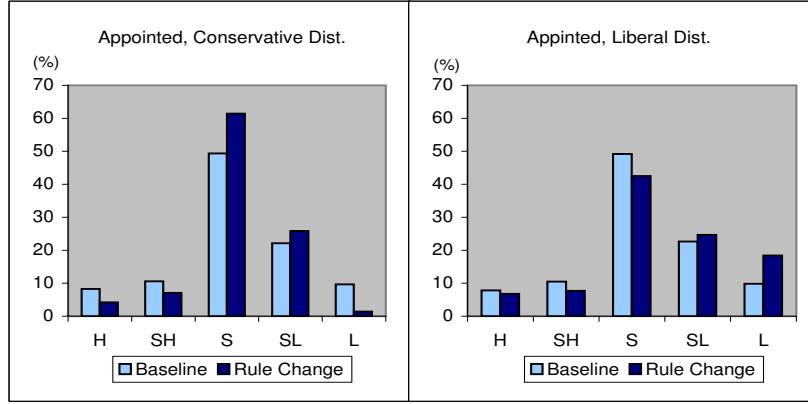


Figure 14: Experiment – Change of Reelection Processes (appointed judges)

Further, it increases the proportion of lenient decisions from 9.8% to 18.3% in liberal districts. However, the degree of disparity between conservative and liberal districts is much smaller than the case when elected judges face a competitive reelection process (Figure 2 in page 4). Because appointed judges' preference type distribution is highly concentrated on the standard type, their decisions in liberal districts would not show a frequency of lenient decisions comparable to that of elected judges even when they have serious reelection concerns.

7 Conclusion

In this study, we proposed a novel approach to comparing two different political institutions, focusing on the selection and retention of judges in the U.S. states. The main innovative features are as follows. First, by conjoining rich individual-level decision data with electoral outcomes and individual-level characteristics, we provide a more rigorous understanding of the relationship between public officials' behavior and the reelection outcomes than the conventional aggregate-level

analysis. Second, by explicitly estimating public officials' preference type distribution jointly with reelection probability, we provide a novel and concrete understanding of the *selection* processes under the two systems. Finally, by conducting counterfactual experiments of changing the reelection processes, we separated out the impact of selection processes and reelection processes on public officials' behavior.

Further, even though we focused on specific judicial selection mechanisms in the U.S. in this study, our framework can be extended to broader subjects that involve both selection and incentive problems of public officials.

Our analysis has shown that the competitive reelection process imposes serious reelection concerns on elected judges, while appointed judges are rubber-stamped by the voters. Moreover, elected judges' reelection process is significantly influenced by political forces such as voters' stochastic party preferences. Lastly, our estimation of the preference distribution shows that there is a substantial difference in judges' sentencing preferences across systems. Appointed judges are much more homogeneous in terms of sentencing preference, due to the centralized aspect of the gubernatorial appointment compared with district-level elections.

While our study provides an enhanced understanding of the actual functioning of selection mechanisms of public officials, there are remaining issues that require further research. First, in our framework, we did not explicitly model the decision of potential candidates to run for office. Since a potential candidate's decision to run for election or to apply for appointment is also affected by the selection mechanisms themselves, incorporating such a stage in the analysis would help to deepen our understanding of the systems. Second, in our data, we had information about individual judges only in terms of age, experience, and party affiliation. However, other individual characteristics such as race and gender may also affect their decisions. How the selection mechanisms affect the composition of public officials in terms of race or gender is an important issue in assessing the social impact of the systems. Third, in our paper, we focused only on criminal sentencing behavior. To further understand judicial selection mechanisms, research on how judges' decisions in other areas are related to their reelection and voters' preference is needed.

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A Kansas Criminal Sentencing Guidelines

Each felony case is classified based on the criminal history of defendants (category A ~ I) and the severity of primary offense (level 1 ~ 10). For each category, the guideline gives three numbers - minimum, standard, and maximum jail time. The judge can choose any jail time between the minimum and the maximum.

Figure 15: Kansas Criminal Sentencing Guidelines

SENTENCING RANGE - NONDRUG OFFENSES									
Category →	A	B	C	D	E	F	G	H	I
Severity Level ↓	3+ Person Felonies	2 Person Felonies	1 Person & Nonperson Felonies	1 Person Felony	3+ Nonperson Felonies	2 Nonperson Felonies	1 Nonperson Felony	Misdemeanor	Misdemeanor No Record
I	653 620 592	618 586 554	285 272 258	267 253 240	246 234 221	226 214 203	203 195 184	186 176 166	165 155 147
II	493 467 442	460 438 416	216 205 194	200 190 181	184 174 165	168 160 152	154 146 138	138 131 123	123 117 109
III	247 233 221	228 216 206	107 102 96	100 94 89	92 88 82	83 79 74	77 72 68	71 66 61	61 59 55
IV	172 162 154	162 154 144	75 71 68	69 66 62	64 60 57	59 56 52	52 50 47	48 45 42	43 41 38
V	136 130 122	128 120 114	60 57 53	55 52 50	51 49 46	47 44 41	43 41 38	38 36 34	34 32 31
VI	46 43 40	41 39 37	38 36 34	36 34 32	32 30 28	29 27 25	26 24 22	21 20 19	19 18 17
VII	34 32 30	31 29 27	29 27 25	26 24 22	23 21 19	19 18 17	17 16 15	14 13 12	13 12 11
VIII	23 21 19	20 19 18	19 18 17	17 16 15	15 14 13	13 12 11	11 10 9	11 10 9	9 8 7
IX	17 16 15	15 14 13	13 12 11	13 12 11	11 10 9	10 9 8	9 8 7	8 7 6	7 6 5
X	13 12 11	12 11 10	11 10 9	10 9 8	9 8 7	8 7 6	7 6 5	7 6 5	7 6 5

B Payoff from Sentencing

In this section, we describe the specification of payoff from sentencing decisions. We assume that the function of judges' payoff from sentencing decisions is single-peaked. We first specify a utility function $\tilde{u}(x_i^*, x)$ with respect to (normalized) jail time x , a continuous variable, and judge i 's most preferred point x_i^* . Then, we derive utility function $u(T_i, p_{it})$ with respect to discrete choice ($p_{it} \in \{H, SH, S, SL, L\}$) and preference type T_i from the underlying utility function $\tilde{u}(x_i^*, x)$.

Specifically, we normalize the minimum jail time as 0 and the maximum jail time as 1, and any jail time between minimum and maximum as a real number in the interval ($x \in [0, 1]$). A judge's payoff from jail time x , when his bliss point is x_i^* , is specified as

$$\tilde{u}(x_i^*, x) = \gamma \cdot \exp\left(-\left(\frac{x_i^* - x}{\sigma_u}\right)^2\right) - \gamma$$

in which γ and σ_u are scale parameters (with $\gamma > 0$, $\sigma_u > 0$), and $x, x_i^* \in [0, 1]$.⁵⁴ The parameter γ which pertains to overall disutility of deviating from one's bliss point is estimated for the three preference types. That is, we estimate γ_H , γ_S , and γ_L for harsh type, standard type, and lenient type, respectively. (The other scale parameter σ_u is estimated to be common across types.) The bliss points (x^*) of harsh type and lenient type are normalized to be 1 and 0, respectively, and that of standard type, denoted by x_S^* , is estimated along with other parameters in the model.

Since the discrete sentencing decision $p_{it} \in \{H, SH, S, SL, L\}$ is based on jail time, we regard that the payoff from each decision in $\{H, SH, S, SL, L\}$ is the average payoff from each of five equal-lengthed intervals of jail time under judges' discretion. That is,

$$u(T_i, p_{it}) = \begin{cases} \int_0^{0.2} \tilde{u}(x^*, x) dx / 0.2 & , \text{if } p_{it} = L \\ \int_{0.2}^{0.4} \tilde{u}(x^*, x) dx / 0.2 & , \text{if } p_{it} = SL \\ \int_{0.4}^{0.6} \tilde{u}(x^*, x) dx / 0.2 & , \text{if } p_{it} = S \\ \int_{0.6}^{0.8} \tilde{u}(x^*, x) dx / 0.2 & , \text{if } p_{it} = SH \\ \int_{0.8}^1 \tilde{u}(x^*, x) dx / 0.2 & , \text{if } p_{it} = H \end{cases}$$

where

$$x^* = \begin{cases} 1 & , \text{if } T_i = t_1 (\text{harsh type}) \\ x_S^* & , \text{if } T_i = t_2 (\text{standard type}) \\ 0 & , \text{if } T_i = t_3 (\text{lenient type}) \end{cases} .$$

⁵⁴Even though the quadratic form of utility function has been frequently used in the theoretical literature, this bell-shaped utility function has been extensively used in the empirical literature of politicians' policy choice. For example, see Poole and Rosenthal (2000).

C Reelection Probability

In this section, we specify the latent variable for the reelection probability of elected judges. As described in Section 2.2, latent variable $Ind_E(XR_{it})$ is composed of three different parts.

$$\begin{aligned} Ind_E(XR_{it}) &= Ind1_E(p_{it}, p_{i,t-1}, Dist_i, Party_i, Noncrime_i) \\ &\quad + Ind2_E(Age_{it}, Tenure_{it}) + Ind3_E(Party_i, SOD_{it}). \end{aligned}$$

We specify the three parts in turn. The first part ($Ind1_E$) measures the effect of sentencing decisions. As in the specification of payoff from sentencing decisions, we employ a bell-shaped function of the continuous jail time variable. Then we derive the effect of discrete sentencing decisions from the underlying function of jail time. Specifically, when a judge's choice of normalized jail time is $x \in [0, 1]$ and voters' the most preferred point is $\hat{x} \in [0, 1]$, the effect of sentenced jail time on the latent variable of reelection probability is

$$f(\hat{x}, x) = \tilde{\phi} \cdot \exp\left(-\left(\frac{\hat{x}-x}{\sigma_f}\right)^2\right) - \tilde{\phi}$$

where $\tilde{\phi} > 0$, $\sigma_f > 0$, and $x, \hat{x} \in [0, 1]$. We allow the scale parameter $\tilde{\phi}$ to differ across parties and political orientation of districts. That is, we estimate $\tilde{\phi}_{DC}$, $\tilde{\phi}_{DL}$, $\tilde{\phi}_{RC}$, and $\tilde{\phi}_{RL}$ for Democrats in conservative districts, Democrats in liberal districts, Republicans in conservative districts, and Republicans in liberal districts, respectively. We also allow the bliss point of voters, \hat{x} , to be different for voters in conservative districts (\hat{x}_C) and voters in liberal districts (\hat{x}_L). Then, the part of the latent variable that measures the effect of (discrete) sentencing decisions is

$$\begin{aligned} &Ind1_E(p_{it}, p_{i,t-1}, Dist_i, Party_i, Noncrime_i) \\ &= \phi_1 + \{\phi_2(Party_i, Dist_i, p_{it}) + \theta\phi_2(Party_i, Dist_i, p_{i,t-1})\} I[Noncrime_i = 0] + \phi_3 I[Noncrime_i = 1], \end{aligned}$$

in which

$$\phi_2(Party_i, Dist_i, p_{it}) = \begin{cases} \int_0^{0.2} f(\hat{x}, x; Party_i, Dist_i) dx / 0.2 & , \text{if } p_{it} = L \\ \int_{0.2}^{0.4} f(\hat{x}, x; Party_i, Dist_i) dx / 0.2 & , \text{if } p_{it} = SL \\ \int_{0.4}^{0.6} f(\hat{x}, x; Party_i, Dist_i) dx / 0.2 & , \text{if } p_{it} = S \\ \int_{0.6}^{0.8} f(\hat{x}, x; Party_i, Dist_i) dx / 0.2 & , \text{if } p_{it} = SH \\ \int_{0.8}^1 f(\hat{x}, x; Party_i, Dist_i) dx / 0.2 & , \text{if } p_{it} = H \end{cases}.$$

and θ is the weight of $p_{i,t-1}$ (the decision in the first half of a term) relative to p_{it} (the decision in the second half of a term).

The second part of the latent variable ($Ind2_E$) pertains to individual judges' characteristics:

$$Ind2_E(Age_{it}, Tenure_{it}) = \phi_4 Age_{it} + \phi_5 Tenure_{it}.$$

The last part of the latent variable ($Ind3_E$) captures the effect of voters' preference over parties, by interacting party affiliation with political climate.

$$\begin{aligned} Ind3_E(Party_i, SOD_{it}) = & \phi_6 I[SOD_{it} = 1] \times I[Party_i = D] + \phi_7 I[SOD_{it} = 2] \times I[Party_i = D] \\ & + \phi_8 I[SOD_{it} = 3] \times I[Party_i = D] + \phi_9 I[SOD_{it} = 1] \times I[Party_i = R] \\ & + \phi_{10} I[SOD_{it} = 3] \times I[Party_i = R] \end{aligned}$$

The parameter estimates for the reelection probability function are reported in Table 20.

D Details of Data

In this section, we provide additional details of our data that were not described in Section 3.

D.1 Exit Decisions

As described in our model, a judge makes an exit decision at the end of each period. In our data, we have 1541 observations of exit decisions and other modes of exit. We show the overall distribution in two different situations : (a) when the seat is not up for reelection (i.e., when a judge is in the first period of a term), and (b) when the seat is up for reelection (when a judge is in the second period of a term). The two modes of exit - death and promotion - in the table are not counted as voluntary exit in our estimation.

Table 12: Exit decisions and other modes of termination : When seat is *not* up for reelection

	Appointed		Elected	
	Frequency	Proportion(%)	Frequency	Proportion(%)
Voluntary Exit	18	4.49	9	2.42
Staying	377	94.01	358	96.24
Death	0	0.00	1	0.27
Promotion	6	1.50	4	1.08

Table 13: Exit decisions and other modes of termination : When seat is up for reelection

	Appointed		Elected	
	Frequency	Proportion(%)	Frequency	Proportion(%)
Voluntary Exit	13	3.00	28	8.38
Running	420	96.77	302	90.42
Death	0	0.00	2	0.60
Promotion	1	0.23	2	0.60

D.2 Political Climate

As stated in the model, the political climate can be one of the three states - ‘favorable to Republican’, ‘neutral’, and ‘favorable to Democrat’. The relationship between the classification of the political climate and the district-level Democratic vote share in the presidential election years is described in Table 14. The 248 observations in Table 14 are from 8 presidential elections and

31 judicial districts in Kansas from 1976 to 2004. The table shows asymmetry of classification, yielding relatively small frequencies of the state ‘favorable to Democrat’. Since the distribution

Table 14: Classification of Political Climate : presidential election years

Political Climate	Frequency	Normalized Democratic Vote Share (%)			
		mean	std. dev.	minimum	maximum
favorable to Republican	85	30.0	3.9	18.4	33.3
neutral	117	39.7	3.6	33.5	45.6
favorable to Democrat	46	52.9	6.9	46.1	72.8

of district-level Democratic vote share is right-skewed, equally dividing three states based on frequencies would yield disproportionately long interval of vote share getting classified as the state ‘favorable to Democrat’. The political climate variable not only means the ‘relative’ preference of voters, but also has meaning in terms of absolute level of vote share. And, the classification in Table 14 is the balanced way of classification considering the overall shape of the vote share distribution. The classification of political climate in gubernatorial election years is summarized

Table 15: Classification of Political Climate : gubernatorial election years

Political Climate	Frequency	Normalized Democratic Vote Share (%)			
		mean	std. dev.	minimum	maximum
favorable to Republican	108	33.6	9.3	16.2	46.5
neutral	102	52.1	3.1	46.5	57.0
favorable to Democrat	38	63.7	6.7	57.1	80.6

in Table 15. The 248 observations in the table is based on 8 gubernatorial elections and 31 judicial districts in Kansas from 1978 to 2006. The rationale behind the classification based on gubernatorial election years is similar to the one for presidential election years. Next, we summarize the relative frequency of the political climates that judges face in conservative and liberal districts under the two systems, in Table 16.

Table 16: Relative Frequency of Political Climate that Judges face (%)

Political Climate	Appointed		Elected		Overall
	Conservative	Liberal	Conservative	Liberal	
favorable to Republican	41.70	17.51	60.20	16.83	30.05
neutral	50.87	33.95	38.80	57.23	47.24
favorable to Democrat	7.43	48.54	1.00	25.94	22.71

D.3 Raw Sentencing Data

As described in the introduction, criminal sentencing in Kansas follows the Kansas Criminal Sentencing Guidelines. Under the guideline, judges' discretion in a case is determined by two case characteristics: defendants' criminal history and severity level of primary offense. These two variables together determine the minimum, standard, and maximum jail time in the law. In this section, we describe the major offenses that constitute each severity level, and summarize the overall distribution of the two key variables in the raw sentencing data. Table 17 illustrates what offenses constitute each severity level. A complete manual for severity level classification of criminal offenses is available at <http://www.accesskansas.org/ksc/2007desk.shtml>.

As shown in Table 17, serious offenses such as rape and murder, which are relatively more often publicized by media, belong to high severity levels (level 1~5). In aggregating raw sentencing decisions into one decision per judge and period in the model, we take into account the severity level of each case and the standard prison time specified in the law.

Next, Table 18 and Table 19 show the relative frequency of each severity level and defendants' criminal history in the raw sentencing data, respectively. The relative frequency shown in Table 18 and 19 are both the relative frequencies in aggregate. The overall frequency of each severity level and each criminal history category is similar across individual judges, reflecting randomized case assignments.

Table 17: Examples of Offenses in Each Severity Level

Severity Level	Offense
Level 1	Murder in the first degree - attempt Murder in the second degree - intentional Rape; sexual intercourse; no consent; overcome with force or fear Aggravated kidnapping
Level 2	Murder in the second degree - reckless Rape; knowingly misrepresenting sexual intercourse legally Aggravated criminal sodomy
Level 3	Voluntary manslaughter Aggravated robbery
Level 4	Aggravated battery; intentional, great bodily harm Involuntary manslaughter while under the influence of alcohol or drugs
Level 5	Involuntary manslaughter Battery Sexual exploitation of a child Theft; \$100,000 or more
Level 6	Arson Aggravated assault on a law enforcement officer
Level 7	Aggravated assault Perjury
Level 8	Aggravated battery; reckless; bodily harm with deadly weapon
Level 9	Aggravated endangering a child Theft; at least \$1,000 but less than \$25,000 Burglary; motor vehicle, aircraft, or other means of conveyance
Level 10	Bigamy Incest Nonsupport of a child

E Parameter Estimates

In Table 20, we report the parameter estimates that underlie the result discussed in Section 5.

Table 18: Relative Frequency of the Severity Level

Severity Level	Relative Frequency (%)
Level 1	1.26
Level 2	0.80
Level 3	4.20
Level 4	1.29
Level 5	6.81
Level 6	2.02
Level 7	19.93
Level 8	15.51
Level 9	37.36
Level 10	10.82

Table 19: Relative Frequency of Defendants' Criminal History

Category	Relative Frequency (%)
A (3+ person felonies)	5.17
B (2 person felonies)	6.80
C (1 person, 1 non-person felony)	11.32
D (1 person felony)	5.91
E (3+ non-person felonies)	13.25
F (2 non-person felonies)	6.81
G (1 non-person felony)	11.73
H (2+ misdemeanor)	10.48
I (1 misdemeanor, no record)	28.55

Table 20: Parameter Estimates

Parameter	Component of the Model	Estimate	Std. Error
Group A: Payoff in the Court			
α_B	Payoff from the seat	174878.2	73832.7
α_{NC}	Additional payoff from non-crime seat	-44784.7	53848.9
γ_H	Scale - Harsh type	42306.2	16246.7
γ_S	Scale - Standard type	58772.7	18747.6
γ_L	Scale - Lenient type	38085.9	17310.4
x_S^*	Bliss point - Stand type	0.4447	0.0123
σ_u	Common scale parameter	0.2375	0.0095
α_R	Payoff from running	-162276.8	95914.0
α_H	Payoff from the high courts	365783.2	329912.7
Group B: Reelection Probability			
ϕ_1	Constant	1.2092	0.0680
$\tilde{\phi}_{DC}$	Scale - Democrat, conservative	0.4709	0.0771
$\tilde{\phi}_{DL}$	Scale - Democrat, liberal	0.0006	0.0015
$\tilde{\phi}_{RC}$	Scale - Republican, conservative	0.9796	0.1015
$\tilde{\phi}_{RL}$	Scale - Republican, liberal	0.7310	0.0568
\hat{x}_C	Bliss point - conservative districts	0.4336	0.0101
\hat{x}_L	Bliss point - liberal districts	0.0104	0.0433
σ_f	Common scale parameter	0.1853	0.0118
θ	Weight on the 1st period decision	0.9254	0.0858
ϕ_3	$I[Noncrime_i]$	-0.3673	0.2687
ϕ_4	Age_{it}	0.0285	0.0015
ϕ_5	$Tenure_{it}$	-0.0804	0.0051
ϕ_6	$I[SOD = 1] * I[Party_i = D]$	-0.7944	0.0991
ϕ_7	$I[SOD = 2] * I[Party_i = D]$	-0.8086	0.0437
ϕ_8	$I[SOD = 3] * I[Party_i = D]$	-0.0600	0.2287
ϕ_9	$I[SOD = 1] * I[Party_i = R]$	-0.1541	0.0339
ϕ_{10}	$I[SOD = 3] * I[Party_i = R]$	-1.2733	0.2330
Group C: Scale parameters of Taste shocks			
σ_Z	Scale - policy	20102.2	6302.2
σ_S	Scale - staying	171855.1	43894.0
Group D: Payoff outside Court			
β_0	Wage - constant	10.0550	0.2116
β_1	Wage - Expriv1	0.9154	0.2366
β_2	Wage - Expriv2	0.9627	0.2318
β_3	Wage - Expriv3	1.1214	0.2200
α_L	Payoff from leisure	155694.8	58998.7