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"The influence of decision-maker effort and case complexity on appealed rulings subject to multi-categorical selection"

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Abstract

This study extends the standard econometric treatment of appellate court outcomes by 1) considering the role of decision-maker effort and case complexity, and 2) adopting a multi-categorical selection process of appealed cases. We find evidence of appellate courts being affected by both the effort made by first-stage decision makers and case complexity. This illustrates the value of widening the narrowly defined focus on heterogeneity in individual-specific preferences that characterises many applied studies on legal decision-making. Further, the majority of appealed cases represent non-random sub-samples and the multi-categorical selection process appears to offer advantages over the more commonly used dichotomous selection models.

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***Keywords*:** Appeal, Decision-maker effort, Case complexity, Selection bias.

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1. Introduction

Many legal systems are structured hierarchically whereby decisions made by the courts of first instance (e.g. bureaucratic agencies and trial courts) can be appealed to higher instances. Decisions made by appellate courts are valuable to market agents since they increase "outcome predictability" and reduce review time through the setting of precedents.[1] Their value for policy makers include 1) a performance assessment of the lower instances, which may serve a self-regulatory purpose and/or as the basis for an active benchmarking programme aimed at increasing court productivity,[2] and 2) insights into how the design of the appellate process can be adjusted to reduce errors by the courts of first instance. Hence, the ability to identify the way in which appellate courts might respond to specific case and environmental characteristics can have substantial welfare implications.

The purpose of this paper is to extend the standard econometric treatment of appellate court outcomes in two directions. First, when evaluating what factors affect these outcomes we include two characteristics of the decision-maker and the case that have not, or only sporadically, received empirical attention so far. This extension investigates the value of looking beyond the ideological heterogeneity between the courts of first instance and the appellate courts that has been the focus in many similar studies. Second, we use an analytical framework based on a general classification of appeals that allows each agent (or combination of agents) to have distinct appeal functions, and the appeals court to respond uniquely to each group of appeals. This is a more flexible framework than the dichotomous classification of cases in 'appeal'/'no appeal' typically found in the literature. In the rest of this section we review these two extensions in more detail.

The standard assumption is that judicial decisions are primarily determined by the law and by the heterogeneity that exists between judicial levels in ideological and private preferences.[3] While the law has been argued to have the largest impact on judicial outcomes (e.g. Cross, 2007), empirical legal studies in the past have placed considerable emphasis on decision-makers' ideology/private preferences.[4] Authors have expressed concern for the relative neglect of the possible role played by other factors (e.g. Czarnezki, 2008). In this study we evaluate the role of *decision-maker effort*

[1] As outlined below, uncertainty and number of precedents can be positively correlated when precedents are in conflict with each other. See Di Vita (2010) for a discussion on the value of a short review time.
[2] See Schneider (2005) for an example applied to German civil law courts.
[3] Guthrie and George (2005) provide an overview of the theories explaining judicial decision-making.
[4] See Eisenberg and Heise (2009), Yates and Coggins (2009), Candeub and Brown (2008), de Figueiredo (2005), Haire et al. (2003), Clermont and Eisenberg (2001) and Spitzer and Talley (1998) for examples of studies primarily based on decision-makers' ideology. Many of these confirm that ideological heterogeneity provides a significant explanation of judicial outcomes.

and *case complexity*, both of which are related to decision quality.[5] To the best of our knowledge, decision-maker effort has never previously been considered in any empirical legal study.

In contrast to effort, case complexity has been subject to previous empirical investigation. Kaheny et al. (2008) have claimed that complexity and decision variability are positively related. However, we argue that using the number of document pages as a proxy for complexity, as these authors do, is not a universally valid proxy. Different writers use different writing styles and background information included in judicial decisions is sometimes merely copied from earlier cases. Clermont and Eisenberg (2002) use review time as a proxy for complexity but as we show in this study there are several factors unrelated to complexity that can have a significant impact on review time. Hence, both these measures appear to be questionable proxies for complexity as well as raising concerns about endogeneity.

The second purpose of this study is to review available methods for the correction of non-random samples. Non-randomness occurs when unobserved factors influence both the litigants' decisions to appeal and the decisions made by the appellate courts. Givati (2010) illustrates the problem by highlighting the consequences of a court of first instance changing its degree of aggressiveness. When this court shifts to a safe (risky) strategy, it reduces (increases) the number of cases being appealed. When this move is unobserved, or ignored by the analyst, it will bias the estimates. Other reasons as to why non-random cases might occur are asymmetric information and divergent expectations among litigants (Seabury, 2009).[6] Kastellec and Lax (2008) use Supreme Court decisions and show through simulation analysis that inferences can be substantially biased when non-random appellate selection is ignored.

An increasing number of empirical studies have identified non-randomness in the sample handled by appellate courts (e.g. Söderberg, 2008; de Figueiredo, 2005; Clermont and Eisenberg, 2002). The standard approach in the law and economics discipline when controlling for selection is to use a dichotomous selection mechanism that treats all appeals as originating from the same probability process. While that can be appropriate in some instances,[7] it should be clear that this is typically a special case as all disputing agents normally have the right to appeal. Hence, the

[5] Similar claims have been made in the theoretical literature. For example, Shavell (2004) and Siegelman and Donohue III (1990) argue that complexity and the likelihood of litigation are positively correlated. The positive relationship between decision quality and affirmance rate has been established empirically by Nash and Pardo (2008).

[6] Siegelman and Donohue III (1990) argue that another source of non-random selection in empirical legal studies is when a decision may be either published or unpublished, making the published sub-sample potentially non-random.

[7] E.g. de Figueiredo (2005) considers a context where only one agent can appeal the decision made by the court of first instance.

multi-categorical selection mechanism is a more flexible and often more appropriate representation of the selection mechanism for legal disputes. Further, a priori it is unreasonable to assume that the plaintiff's and defendant's decisions to appeal are statistically identical. Our purpose is to demonstrate the importance of correcting for non-random case selection in general, and the value of a multi-categorical selection principle in particular. We are unaware of any legal study using a multi-categorical selection mechanism to analyse appealed rulings.

We draw on two diverse legal data sets to illustrate the benefits of our suggestions. First we look at regulatory disputes in the Swedish electricity sector where customers have filed complaints about monopoly conditions to a sectoral regulator. Some of the decisions made by the regulator have subsequently been appealed to the first administrative court of appeals (the County Administrative Court). The second data set represents motor car injury claims in Spain. These disputes are first dealt with by a trial court and, in case the plaintiff or the defendant decides to appeal, by the appellate court.

When looking at disputes in the Swedish electricity distribution market we investigate the role of both effort and complexity. We claim that effort and review time are positively correlated, which is consistent with Prendergast's (2003) suggestion that the longer a case is investigated, the higher the quality of the decision.[8] By using review time as the dependent variable and controlling for all other factors that have a structural influence on review time, we can proxy effort by the resulting residuals. The number of precedents is used as a proxy for decision complexity. As the number of precedents is unambiguously exogenous in relation to the present case, and since all precedents must be considered by the regulator and the court, it provides a more straightforward econometric solution and is a more objective measure than both number of pages and review time. Following Fon and Parisi (2006), we would expect a rich availability of precedents to create more complexity for a technically oriented regulator than it would for a court. This is particularly true when, as in our case, there is a large degree of divergence in precedents.

The second data set looks at motor car injury disputes in Spain. The focus here is on case complexity. The relatively high degree of complexity in Spanish motor car law is due to the subjective nature of financial compensation. The court's ruling is typically made in a different year to that in which the motor accident occurred. The courts interpret the rules for how financial compensation ought to be updated differently. The system used in updating compensation, which influences the likelihood of receiving a favourable decision, is used as a proxy for decision

[8] Schneider (2005) finds empirical support for a positive relationship between productivity and rate of reversal, which can be interpreted as shorter review times lead to decisions of lower quality.

complexity. Discrepancies between the legal medical evaluation and the court's decision on how to calculate interest further add to this complexity. The effect on the appeal process of these complexity proxies is especially relevant because these factors may be regulated by policy makers.

Foreshadowing our main results, we find evidence of appellate courts being affected by the effort made by first-stage decision makers and case complexity. Consistent with our hypothesis, this illustrates the value of widening the narrowly defined focus on heterogeneity in individual-specific preferences that still characterises many applied studies on legal decision-making. Further, the majority of appealed cases represent non-random sub-samples and the multi-categorical selection mechanism appears to have advantages over the commonly used dichotomous selection models.

The paper proceeds with a section on the methodological details of obtaining unbiased estimates at the appeal stage when the available sample is potentially non-random. Section 3 looks at regulatory decision-making in the Swedish electricity sector and Section 4 contains an analysis of motor car injuries in Spain. Section 5 concludes.

2. Principles of selection

Formally, sample selection may be interpreted as an identification problem in which outcomes are only partially observed (Manski, 1995). Owing to sample bias, least squares (LS) regression leads to inconsistent parameter estimates. To avoid this inconsistency, a sample selection correction is required. However, given that there are many different selection generating possibilities available, correction mechanisms must be designed to reflect the true process. Since Heckman's (1976) pioneering work, the sample selection problem has been extensively studied in the literature (see, for example, Heckman, 1979; Winship and Mare, 1992; Lee and Marsh, 2000).[9] Most of the attention has focused on sample selection mechanisms based on binary dependent variables which are parametrically modelled by a probit or logit specification. When selection is generated over a number of choices greater than two, the multinominal logit model has been proposed as an interesting alternative at the selection stage. Studies in the literature following this approach include Lee (1983), Dubin and McFadden (1984) and Dahl (2002).

[9] For a review of selection models see Cameron and Trivedi (2005) or Greene (2003)

Dichotomous selection

Let y be the appeal court financial ruling which is the outcome of interest. This appeal court judgement is observed only if $y^* > 0$, where y^* reflects the decision to appeal the decision made in the court of first instance. In our applications the first instance judgement relates to the regulator decision or trial court verdict, respectively. The model is specified as follows:

$$\begin{aligned} y_i^* &= z_i' \gamma - u_i \\ y_i &= x_i' \beta + \varepsilon_i \end{aligned} \qquad (1)$$

for the *i-th* individual, *i*=1…*N*, where z_i and x_i are the vectors of regressors and γ and β are the vectors of parameters. The errors u_i and ε_i are normally distributed with variance σ_u^2 and σ_ε^2, and covariance σ_{12}. y^* is a latent variable. The observed variable I is related to y^* according to:

$$I_i = \begin{cases} 1 \text{ if } y_i^* > 0 \\ 0 \text{ if } y_i^* \leq 0 \end{cases},$$

where I_i takes value 1 when the *i-th* judgement made in first instance is appealed by litigants and zero if not. Heckman (1976) suggested a two-step procedure to estimate the parameters. First γ is estimated by probit regression of *I* on *z*. The Heckman-type lambda λ^H is then computed to account for non-random sampling bias:

$$\begin{aligned} y_i &= x_i' \beta - \sigma_{12} \lambda_i^H + \nu_i \\ &= x_i' \beta - \sigma_\varepsilon \rho \lambda_i^H + \nu_i \end{aligned} \qquad (2)$$

such that $\lambda_i^H = \phi(z_i' \hat{\gamma}) / \Phi(z_i' \hat{\gamma})$, where $\phi(\cdot)$ and $\Phi(\cdot)$ are the standard normal density and distribution functions. Sample selection occurs when the correlation between errors is not null, where the correlation is $\rho = \sigma_{12} / \sigma_u \sigma_\varepsilon$. Parameters in (2) are estimated by LS techniques. Because of heteroscedastiticy and γ replacement by estimates, LS standard errors cannot be directly used as an estimator of the asymptotic covariance matrix. Heckman (1979) and Greene (1981) provide an asymptotic covariance matrix estimate which accounts for these characteristics. Parameters could also be estimated by maximum likelihood (ML), which increases the efficiency. However, additional (and testable) assumptions about the joint distribution of errors are required to go from the two-step estimation to the ML estimation (Cameron and Trivedi, 2005). Additionally, the two-step Heckman procedure facilitates model comparisons since Lee's model is only available as a two-step procedure.

Multi-categorical selection

Now consider the case when sample selection is based on *J* exclusive choices, where *J*>2. Lee (1983) proposed a generalization of the Heckman two-step estimator. In an analogous form to the dichotomous selection, the model is specified as follows:

$$\begin{aligned} y_{ji}^{*} &= z_i^{'}\gamma_j + u_{ji} \qquad j = 1,\dots,J \\ y_i &= x_i^{'}\beta + \varepsilon_i \end{aligned} \tag{3}$$

where y_i is observed if $y_{1i}^{*} > \max_{j\neq 1}(y_{ji}^{*})$. y^{*}'s are latent variables. The observed variable D_i consists of *J* categories, where $D_i = 1$ if $\eta_{1i} < 0$ such that $\eta_{1i} = \max_{j\neq 1}(y_{ji}^{*} - y_{1i}^{*})$. γ's are estimated by a multinomial logit regression model, where the probability of the category *k* is:

$$P_k = P(D_i = k) = \frac{\exp(z_i^{'}\gamma_k)}{\sum_{j=1}^{J}\exp(z_i^{'}\gamma_j)} \qquad 1 \le k \le J.$$

Given $\Gamma_i = \left\{z_i\gamma_1, z_i\gamma_2, \dots, z_i\gamma_J\right\}$, Lee (1983) showed that a consistent estimator of β is obtained when the following regression is estimated by least squares:

$$\begin{aligned} y_i &= x_i^{'}\beta + \mu(\Gamma_i) + w_i \\ &= x_i^{'}\beta - \sigma_\varepsilon\rho_1\frac{\phi[\Phi^{-1}(F_{\eta_1}(0\,|\,\Gamma_i))]}{F_{\eta_1}(0\,|\,\Gamma_i)} + w_i \\ &= x_i^{'}\beta - \sigma_\varepsilon\rho_1\lambda_i^{L} + w_i \end{aligned} \tag{4}$$

where $F_{\eta_1}(\cdot\,|\,\Gamma)$ is the cumulative distribution function of η_1 and ρ_1 the correlation between ε and $\Phi^{-1}(F_{\eta_1}(\eta_1\,|\,\Gamma))$. The estimator of the asymptotic covariance matrix is obtained in an analogous way to that in the Heckman procedure (Lee, 1983). Lee's sample selection correction relies on linearity assumptions over the form of $\mu(\Gamma)$. Restrictions over $\mu(\Gamma)$ are required to make it statistically tractable. Alternative multi-categorical sample selection corrections suggested in the literature vary depending on the restrictions imposed on $\mu(\Gamma)$. The Lee approach involves the estimation of fewer parameters at the cost of flexibility. Therefore this method is especially appropriate for small sample sizes, as in our applications.[10]

[10] See Bourguignon et al. (2007) for a detailed discussion of selection models involving multi-categorical selection mechanisms. The other correction methods outlined by Bourguignon et al. (2007) were also evaluated but Lee's method showed the best results, which supports the argument that Lee's method is preferred for small samples.

3. The appeals process in the Swedish electricity market

In the Swedish electricity distribution sector, customers can file complaints to the regulator about the contract conditions determined by monopolistic utilities. Based on its investigations, the regulator either confirms the conditions in full or withholds a proportion of the utility's 'benefits' – e.g., the price if the case concerns a monetary transfer. Either the customer or the utility can appeal the regulator's decision to the County Administrative Court (CAC).[11] Here, we focus solely on connection disputes that arise when customers complain about the price quoted by utilities for establishing a new connection to the existing network. Focusing on one type of dispute eliminates the need to consider case heterogeneity.

The effort made by each regulatory decision-maker is unobserved and has to be proxied. As a starting point, we work on the understanding that, *ceteris paribus*, a greater amount of effort requires a longer review. Thus, we propose that a regulatory decision-maker's efforts be proxied with the residuals of a function where the review time (*RRevTi*) is the dependent variable and workload, decision complexity, decision-maker experience, utility size and ownership, and decision-maker fixed effects are the independent variables. However, Lax and Cameron (2007) have suggested that workload might also have a direct effect on effort since decision-makers might respond to higher workload by conducting quicker, less thorough investigations. Thus, to circumvent this endogeneity problem we replace workload with a variable representing the number of days since the Swedish electricity market was deregulated (*Days*) and a dummy for cases representing connection of mobile antennas (*Ant*). Workload has increased steadily during the period of deregulation, while the connection of mobile antennas is more readily reviewed due to a relatively high degree of standardisation.[12] Decision complexity is given by the total number of precedents that has to be considered for each decision (*NoPrec*). A precedent is defined as a case decided by the CAC in the past that falls into the same category as the present case. *ThreeL* is a dummy variable taking the value 1 when the utility is one of the three largest and *UtiPri* is a dummy that equals 1 when the utility is privately owned. Both *ThreeL* and *UtiPri* control for utility heterogeneity, such as financial and legal strength, which has been claimed to influence appellate court decisions (Kaheny et al., 2008). *DM1* and *DM2* are used to control for decision-makers' time-invariant characteristics, such as their inclination to engage in strategic behaviour.[13] With these variables, the specification can be formulated as:

[11] Further details of the regulatory dispute process in the Swedish electricity sector can be found in Smyth and Söderberg (2010).
[12] We also evaluated the model with workload included as a regressor (calculated as the number of decisions made during the previous 12 months), and found the same qualitative results.
[13] See Levy (2005) for discussion and theoretical justification.

$$RRevTi = \alpha_0 + \alpha_1 Days + \alpha_2 Ant + \alpha_3 Days \times Ant + \alpha_4 NoPrec + \alpha_5 ThreeL + \alpha_6 UtiPri + \alpha_7 DM1 + \alpha_8 DM2 + \eta \quad (5)$$

Using the LS estimator we obtain the residuals $\hat{\eta}$ which are used to represent decision-makers' effort. The output of eq. (5) is displayed in the Appendix (Table A2) and is not discussed further here since the *α*-parameters only serve the purpose of identifying $\hat{\eta}$ in this particular application. The descriptive statistics for all the equations in this section are also provided in the Appendix (Table A1).

It is hypothesised that the litigant's probability of appealing is affected by whether the regulator's decision contains error(s), the amount withheld by the regulator, and the litigant's budget constraints. Privately owned (i.e. profit-maximising) utilities might have financial incentives that differ from those of their publicly owned counterparts and a customer formed as a corporation will face a lower cost of litigation than that faced by a private person. Hence, the first two variables we consider in the appeal function are *UtPri* and *CustC*, where *CustC* indicates whether the customer is a corporation. To capture the deviation between the regulator's assessment and a utility's initial claim, we create a variable of the ratio between the amount awarded by the regulator *Pr* and the amount charged by the utility, *Pu*. The hypothesis is that customers are more inclined to appeal for high levels of *Pr*/*Pu*, whereas the opposite holds for the utilities. Violation of the customer's budget constraints is included through the length of the low voltage line required to connect the customer (*LengL*). This is very closely related to the total cost of the connection.

When specifying the CAC's decision, we begin by creating the dependent variable as the ratio between the amount awarded by the court and that awarded by the regulator (*Pc*/*Pr*). Dividing the court's award by the regulator's eliminates the influence of any basic cost drivers such as transformers and high/low voltage line lengths for which the regulator and court have long since established templates that are widely accepted by the agents involved. The court's review time (*CRevTi*) is used to collectively represent the factors included in eq. (5). A similar analysis to that involved in eq. (5) cannot be performed for the court due to lack of data. *NoPrec* is used to investigate how the regulator responds to increased complexity. The inclusion of *ThreeL*, *DM1* and *DM2* can be justified on the same grounds as presented above. Decision-makers' experience and their exposure to litigant and court behaviour are accounted for by including *NoDec* – the total number of regulatory decisions they have made. Using Heckman's model, the equations that determine the relative amount awarded by the court can then be expressed as:

$$AppeCu = \gamma_0 + \gamma_1 UtPriv + \gamma_2 CustC + \gamma_3 \hat{\eta} + \gamma_4 NoPrec + \gamma_5 (Pr/Pu) + \gamma_6 LengL - u \quad (6)$$

$$Pc/Pr = \beta_0 + \beta_1 \hat{\eta} + \beta_2 CRevTi + \beta_3 NoPrec + \beta_4 ThreeL + \beta_5 DM1 + \beta_6 DM2 + \beta_7 NoDec - \sigma_\varepsilon \rho \lambda^H + v \quad (7)$$

where *AppeCu* takes the value 1 when a case is appealed by a customer and 0 otherwise. When investigating how the court treats cases appealed by utilities, we create a new dependent variable, *AppeUt* that takes the value 1 only when utilities appeal and 0 otherwise. Similar reasoning applies for when both customers and utilities appeal (*AppeBo*).

However, the dichotomous selection mechanism used in Heckman's model ignores the multi-categorical nature of the appeals process. A less restrictive specification would allow the regulatory decisions to be classified in four categories: 1) customer appeals, 2) utility appeals, 3) both customer and utility appeals, and 4) no appeals from either party. Such an approach suggests the appropriateness of using Lee's model. An objection to using Lee's model, however, is that outcome 4 may be correlated with outcomes 2 and 3, which would invalidate the assumption of independent outcomes that the multinomial logit model rests on. Nevertheless, Monte-Carlo simulations have shown that selection mechanisms based on the multinomial logit perform well even when the assumption of independent categories is violated (Bourguignon et al., 2007). When Lee's method of correction is used and regulatory decisions are classified into these four categories using *AppeCat* as the dependent variable, eqs. (6) and (7) can be modified according to:

$$AppeCat = \gamma_0 + \gamma_1 UtPriv + \gamma_2 CustC + \gamma_3 \hat{\eta} + \gamma_4 NoPrec + \gamma_5 (Pr/Pu) + \gamma_6 LengL + u_1 \quad (8)$$

$$Pc/Pr = \beta_0 + \beta_1 \hat{\eta} + \beta_2 CRevTi + \beta_3 NoPrec + \beta_4 ThreeL + \beta_5 DM1 + \beta_6 DM2 + \beta_7 NoDec - \sigma_\varepsilon \rho_1 \lambda^L + w \quad (9)$$

Depending on the regulator's specific objective one can form different expectations about γ_3, γ_4, β_1 and β_3 in eqs. (6)-(9). If the regulator is truth-seeking and unbiased, increased effort will reduce the probability of appeals and lead to the hypothesis that $\gamma_3<0$. If the regulator's preferences are biased in favour of the customers, as suggested by Smyth and Söderberg (2010), we would expect $\gamma_3<0$ when the customers appeal and $\gamma_3>0$ when the utilities do so. Greater complexity increases the opportunity for each litigant to promote their own private preferences (leading to $\gamma_4>0$), but if the litigants suffer from a shortage of information relative to the regulator, $\gamma_4<0$ is expected. The net effect of these forces is therefore ambiguous. If the regulator is unbiased, β_1 and β_3 will drive *Pc*/*Pr* towards 1. If the regulator is pro-consumer, β_1 and β_3 will be >0.

Estimations of eqs. (6) and (7) are shown in the first three columns of Table 1, and eqs. (8) and (9) are presented in the last three columns. As indicated, both Heckman's and Lee's models show that the error covariance is significant when customers or utilities appeal, which suggests that the vast majority of cases handled by the CAC are drawn from non-random processes of disputes. A comparison of the two models shows that greater explanatory power and consistently lower AIC-values are provided by Lee's more flexible model. While informative, these measures are not entirely conclusive since they do not account for the fact that the first stage coefficients are estimates. However, the statistical results for a number of individual parameters also differ between the two models. Thus, overall it would seem that Lee's model offers advantages over Heckman's more restrictive model in this case. Consequently, we focus on Lee's model, and in particular on how γ_3, γ_4, β_1 and β_3 influence the appeal process, when giving more detailed comments on the empirical outcome.

Table 1. Estimation output for eqs. (6)-(9).

	Heckman's model			Lee's model †		
	Customer appeals	Utility appeals	Both appeal	Customer appeals	Utility appeals	Both appeal
Variable	**Coeff. (SE)**	**Coeff. (SE)**	**Coeff. (SE)**	**Coeff. (SE)**	**Coeff. (SE)**	**Coeff. (SE)**
Stage 1 (Appeals)						
UtPri	-0.3647	0.0344	-0.5946 ***	-1.4381 **	-0.8189 **	-1.7286 ***
	(0.2768)	(0.1547)	(0.1950)	(0.5690)	(0.3247)	(0.4256)
CustC	2.2481 ***	0.0998	1.4942 ***	4.7413 ***	1.0842 ***	3.3434 ***
	(0.7809)	(0.1841)	(0.4290)	(1.8175)	(0.3430)	(0.8441)
$\hat{\eta}$	6.3×10^{-4}	0.0011 **	-3.6×10^{-4}	0.0020	0.0019 **	4.5×10^{-5}
	(8.9×10^{-4})	(4.6×10^{-4})	(5.5×10^{-4})	(0.0019)	(9.4×10^{-4})	(0.0012)
NoPrec	-0.0217	-0.0201 ***	0.0048	-0.0503 *	-0.0407 ***	-0.0104
	(0.0154)	(0.0062)	(0.0064)	(0.0290)	(0.0115)	(0.0151)
Pr/Pu	4.8451 ***	-1.6244 ***	-1.0450 ***	9.6175 ***	-2.8074 ***	-2.6702 ***
	(0.7484)	(0.3233)	(0.3928)	(2.1686)	(0.7276)	(0.9145)
LengL	8.6×10^{-4} **	-2.6×10^{-4}	-2.4×10^{-4}	0.0014	1.2×10^{-5}	5.0×10^{-5}
	(4.2×10^{-4})	(3.1×10^{-4})	(4.1×10^{-4})	(9.0×10^{-4})	(6.6×10^{-4})	(9.0×10^{-4})
Constant	-6.8418 ***	1.3741 ***	-1.3504 **	-11.863 ***	3.1829 ***	-0.1943
	(1.1925)	(0.3542)	(0.5617)	(2.8625)	(0.7318)	(1.2020)
Stage 2 (CAC decisions)						
$\hat{\eta}$	6.7×10^{-5}	4.6×10^{-4} ***	-2.6×10^{-4}	7.5×10^{-5}	4.0×10^{-4} **	-2.1×10^{-4}
	(1.5×10^{-4})	(1.8×10^{-4})	(2.9×10^{-4})	(1.5×10^{-4})	(1.8×10^{-4})	(3.0×10^{-4})
CRevTi	-4.8×10^{-4} **	2.3×10^{-5}	8.6×10^{-4} **	-4.5×10^{-4} *	2.5×10^{-4}	9.6×10^{-4} **
	(2.4×10^{-4})	(2.6×10^{-4})	(3.7×10^{-4})	(2.4×10^{-4})	(2.6×10^{-4})	(4.0×10^{-4})
NoPrec	0.0082 ***	0.0079 *	0.0027	0.0080 **	0.0094 **	0.0037
	(0.0031)	(0.0047)	(0.0051)	(0.0033)	(0.0047)	(0.0058)
ThreeL	-0.1356 ***	0.0208	0.0513	-0.1199 ***	0.0225	0.0834
	(0.0434)	(0.0513)	(0.0788)	(0.0453)	(0.0509)	(0.0959)
DM1	-0.2963 ***	-0.0899	0.0583	-0.2872 ***	-0.0906	0.0542
	(0.0941)	(0.0980)	(0.1043)	(0.0987)	(0.0976)	(0.1070)
DM2	-0.2619 ***	-0.0225	-	-0.2485 **	-0.0060	-
	(0.0976)	(0.1245)		(0.1025)	(0.1234)	
NoDec	2.3×10^{-5}	8.2×10^{-4} *	2.4×10^{-4}	4.7×10^{-5}	7.7×10^{-4}	4.8×10^{-5}
	(3.6×10^{-4})	(4.9×10^{-4})	(4.9×10^{-4})	(3.7×10^{-4})	(4.9×10^{-4})	5.6×10^{-4}
Constant	1.3426 ***	0.9943 ***	0.9203 ***	1.3168 ***	1.0256 ***	0.9422 ***
	(0.1134)	(0.1482)	(0.1865)	(0.1179)	(0.1486)	(0.2010)
Lambda	-0.1354 ***	-0.2220 *	-0.2367	-0.1470 ***	-0.3193 **	-0.2986
	(0.0320)	(0.1153)	(0.1555)	(0.0397)	(0.1325)	(0.1957)
R^2	0.487	0.331	0.149	0.512	0.341	0.152
AIC	-4.238	-2.452	-3.078	-4.290	-2.467	-3.0818

N_1=337 (sample size in first stage).

N_2=41 (sample size in second stage when customers appeal); N_2=132 (sample size in second stage when utilities appeal); N_2=60 (sample size in second stage when both customers and utilities appeal).

Notes: † Base category: neither party appeals.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

γ_3 is positive and significant when utilities appeal and insignificant when customers appeal, which suggests that the regulator is pro-consumer. γ_4 is negative for all types of appeal, which suggests that the regulator's use of precedents universally reduces the likelihood of appeals. Based on the above reasoning, this outcome is consistent with litigants having limited access to information relative to the regulator.

β_1 is positive when both customers and utilities appeal. When the regulator puts in the least effort (see descriptive statistics in Table A1) the court will increase the amount the utility is allowed to charge by 55%. When the regulator puts in the most effort the court increases the amount by 70%. Hence, the CAC's response to the regulator's efforts provides further evidence of the regulator being pro-consumer. Finally, β_3 is positive and significant when both the customers and utilities appeal (at least at the 10 % level) which supports the notion that the regulator overly depreciates precedents in favour of utilities. As the point estimates are almost identical, there is no evidence that the regulator is unable to assess many and contradictory precedents as suggested by Fon and Parisi (2006).

4. The appeals process in the Swedish electricity market

Spain's motor vehicle law is an at-fault system in which victims not responsible for an accident are entitled to financial compensation for injuries incurred. Moreover, third-party insurance is compulsory, which means that disputing agents normally bring claims against the insurance companies of at-fault drivers. Financial compensation for personal injuries is assessed according to a scheduled scale. Reducing uncertainty over such amounts, and hence also the probability for instigating litigation, was stated as being one of the main objectives for the introduction of this system in 1995. However, around 10% of cases are still heard before a trial court (first instance), and a substantial proportion of first instance verdicts are taken on appeal to higher instances (Santolino, 2010).

We examine 202 motor bodily injury disputes settled by judicial decision in 2002 and 2003 of which 145 were resolved in first instance[14] and 57 by the appeal court. Both parties are entitled to appeal the first instance judgement and 32 rulings were appealed by the victim and 25 by the insurer. The appeal is a two-stage decision process in which agents first decide whether to bring a subsequent appeal against the court of first instance's ruling. Santolino (2010) focused on this first

[14] Litigants explicitly renounce proceeding with the judicial process and bringing an appeal before a higher court.

stage and investigated the determinants of an agent's decision to appeal. In this study we go one step further in the modelling of the appeal process and include the appeal court's performance at the second stage. This performance is measured as $\ln(C_A/C_T)$, where C_A is the compensation awarded by the appeal court and C_T the damages previously awarded by the trial court. Natural logarithms are taken to reduce data dispersion.

We investigate the effect of four factors on the judgement made by the appeal court when the claimant brings an appeal against the trial court's decision.[15] These factors each reflect the complexity of Spain's compensation system for personal injuries incurred in motor accidents. A source of disputes between claimant and insurer is that of fault allocation. We capture discrepancies in accident responsibility using the variable *Fault*, which takes the value 1 when the insurer has some doubts as to whether the insured driver was fully responsible for the accident. It is difficult to determine a priori whether the percentage of fault allocated by the trial court is revised by the appeal court. Therefore, the effect of this variable on the performance of the appeal court is unclear. The variable *Sever* computes the difference in the severity of the injury as identified in the ruling and that stated by the forensic doctor. Severity of injuries is evaluated by means of a disability scoring scale, which identifies a range of injuries and fixes a maximum-minimum score for each.[16] Disputes may well arise over the severity of injury, as financial compensation for injuries are awarded on the basis of this disability score. Although the forensic report is not binding, it is expected that the appeal court will take it into consideration and revise the degree of severity as assessed by the trial court if the latter score does not match that reported by the expert.

The variable *System* identifies the compensation system that is to be applied in the event that the year in which the accident occurred and the year in which the claim is heard differ. In practise, this is often the case given the time needed for a victim to recover following a traffic accident and the duration of legal proceedings. When it occurs there are two approaches to determining which compensation system applies. Some legal experts consider compensation to be a debt of wealth and that, therefore, the system in force at the time of the trial should be applied so as to maintain wealth equivalent over time. Others hold that compensation is a debt of money and as such the system in force at the time of the accident should be applied, since it already includes procedures for updating the value of money. This discussion is of relevance because significantly higher amounts are obtained when the system in force at the time of the trial is employed. The variable *System* takes the value 1 if the compensation system applied was that in force at the time of the

[15] A similar analysis was made for insurers but owing to the limited sample size, no appeal results were obtained.
[16] See Boucher and Santolino (2010) for further details on this scale.

accident. Finally, the variable *Inter* indicates whether the insurer is not charged interest for delaying payment. These factors reflect various elements of complexity in the sense that there is more than one assessment practice, and the option chosen depends largely on the presiding judge. The assessment practice selected will always be advantageous to one party or the other. However, it is not easy to hypothesize how this complexity might affect the behaviour of the appeal court.

Two further variables are included in the selection regressions. The compensation awarded by the trial court C_T is included to analyze the effect of the amount of damages on the appeal decision. This variable was dropped in the second stage in order to avoid endogeneity. The variable *Time* records the number of years that elapse from the date of the accident to the trial court making its ruling so as to capture the agents' budget constraints. Descriptive statistics of all the variables are shown in Table A3. The Heckman model can be defined as,

$$AppeVic = \gamma_0 + \gamma_1 Fault + \gamma_2 Time + \gamma_3 Sever + \gamma_4 System + \gamma_5 C_T + \gamma_6 Inter - u$$
$$\ln(C_A/C_T) = \beta_0 + \beta_1 Fault + \beta_2 Sever + \beta_3 System + \beta_4 Inter - \sigma_\varepsilon \rho \lambda^H + v \qquad (7)$$

where the variable *AppeVic* takes the value 1 when the victim brought an appeal against the ruling of the court of first instance and 0 if not. The Heckman-type selection brings together those decisions against which an appeal was brought by the insurer and those against which no appeal was lodged. However, unlike Heckman's model, Lee's model can take into account the multinomial nature of the dependent variable as follows:

$$Appeal = \gamma_0 + \gamma_1 Fault + \gamma_2 Time + \gamma_3 Sever + \gamma_4 System + \gamma_5 C_T + \gamma_6 Inter + u_1$$
$$\ln(C_A/C_T) = \beta_0 + \beta_1 Fault + \beta_2 Sever + \beta_3 System + \beta_4 Inter - \sigma_\varepsilon \rho_1 \lambda^L + w \qquad (8)$$

where the variable *Appeal* consists of three categories: 1) if the victim appeals, 2) if the insurer appeals and 3) if neither party appeals.

It is important to select the adequate model specification because notable differences are observed between the two models' estimates (Table 2). Lee's model seems preferable based on the goodness-of-fit measures (R^2 and AIC-value). What is more, the covariance estimate is not significant in Heckman's specification. As such, Heckman's model is not sufficiently justified against the regression model without selection and further analysis is required. Lee's specification, however, captures the multi-categorical nature of the selection mechanism better as is indicated by the significance of the covariance estimate. In conclusion, Lee's model seems to provide a more adequate fit to these data.

Table 2. Performance of Spain's appeal court with correction for non-random sampling

	Heckman's model		Lee's model †			
	Victim appeals		Victim appeals		Insurer appeals	
Variable	**Coeff. (SE)**		**Coeff. (SE)**		**Coeff. (SE)**	
Stage1						
Fault	-1.1274 (0.5294)	**	-1.8739 (0.9483)	**	0.7938 (0.5838)	
Time	-0.2708 (0.1868)		-0.4773 (0.3358)		0.0383 (0.2024)	
Sever	-0.1025 (0.0402)	**	-0.1742 (0.0701)	**	0.0432 (0.0607)	
System	0.1688 (0.3114)		0.1441 (0.5008)		-1.1348 (0.4971)	**
Comp	-0.0333 (0.0151)	**	-0.0575 (0.0280)	**	0.0006 (0.0169)	
Inter	1.8569 (0.3586)	***	3.1283 (0.6455)	***	-0.7172 (0.8797)	
Constant	-0.9103 (0.3139)	***	-1.3436 (0.5847)	**	-1.4686 (0.4262)	***
Stage2						
Fault	-0.3769 (1.6078)		-0.02752 (1.4305)		-	
Sever	-0.0636 (0.0337)	*	-0.0624 (0.0300)	**	-	
System	-3.0544 (0.9088)	***	-3.0281 (0.8047)	***	-	
Inter	1.6164 (1.8392)		1.4899 (1.5700)		-	
Constant	5.588 (2.5996)	**	5.7422 (2.2113)	***	-	
Lambda	-2.3077 (1.4969)		-2.4007 (1.2863)	**	-	
R^2	0.749		0.753		-	
AIC	4.485		4.471		-	

N_1=202 (sample size in first stage).
N_2=32 (sample size in second stage).
Notes: † Base category: neither party appeals.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

An analysis of the results provided by Lee's model shows that the variable *Inte*r presents a significant and positive coefficient in the first stage. This suggests that the non application of interest for delay has an influence on the victim's decision to appeal. The probability of the victim bringing an appeal against the ruling increases if the trial court holds that interest for delay in payment is not applicable. However, the probability of the insurer bringing an appeal is not affected. Likewise, the appeal court does not revise the trial court judgement as to whether the insurer is obliged to pay interest in first instance, as indicated by the lack of significance of the *Inter* coefficient in the second stage. Similarly, the variable *Fault* is only found to have an influence on the victim's decision to appeal. The probability of the victim bringing an appeal decreases when the insurer has doubts as to whether the insured driver was fully responsible, but neither the behaviour of the insurer or that of the appeal court are influenced by this factor.

The variable *Sever* shows significant coefficients in both stages. As expected, the probability of the victim bringing an appeal is inversely related with the *Sever* variable (note that the forensic examination is a neutral medical evaluation). A positive value for this variable indicates that the trial court has, at least partially, taken into consideration the severity of personal injury claimed by the victim. Consequently, the victim is less likely to dispute the ruling. The significance of the coefficient in the second stage indicates that the appeal court tends to revise the damages awarded when the severity of injury stated at first instance does not accord with the forensic evaluation. We expected this variable to be positively related to the insurer's decision to appeal, but the lack of significance might reflect imperfect information as the forensic report is not always available to the insurer.

An interesting result is noted for the variable *System*. The negative coefficient reported by the insurer's decision suggests that the insurer is less likely to appeal if the system in force at the time of the accident were to be applied in assessing financial compensation. This result is expected given that lower amounts are obtained when compensation is considered as a debt of money as opposed to a debt of wealth. By contrast, this variable is devoid of any capacity to explain the victim's likelihood of appealing. This result might well reflect insurers' greater expertise enabling them to recognise the application of somewhat obscure standards by trial courts (Santolino, 2010). This is in accordance with the negative sign of the variable in the second stage, which indicates the tendency of the appeal court to consider damages as a debt of money and, therefore, to apply the system in force at the time of the accident. Finally, the variable C_T shows a negative coefficient to explain the victim's probability of appealing. This indicates that the value of the claimant's decision to appeal depends inversely on the size of the damages awarded.

However, the variable has no influence on the insurer's behaviour. A plausible explanation here is that claimants are relatively more risk averse (Ayuso et al., 2011).

To conclude, a rational litigant will bring an appeal against the trial court's ruling if the net benefit is sufficiently high, i.e. if the probability of revocation is high enough. The insurer's decision to appeal is motivated solely by trial court criteria such as the compensation system that is to be applied, given that appeal courts tend to revise this favourably in the second instance. However, the victim's decision to appeal is influenced by factors such as the none application of interest and whether there are doubts concerning full responsibility for the accident, factors that are not revised by the appeal courts. In short, insurers seem to take more rational appeal decisions than those taken by claimants. An explanation for this might lie in the fact that insurers have a better understanding of the behaviour of the appeal courts.[17]

5. Conclusions

The ability to identify how appellate courts respond to specific case and environmental characteristics can have substantial welfare implications. In examining these, many applied legal studies have focused on heterogeneity in individual-specific preferences of appellate courts, typically treating the non-randomness of appellate cases as a dichotomous process. This study has extended these standard analyses by 1) considering the role of decision-maker effort and case complexity, and 2) adopting a multi-categorical selection process of appealed cases where each agent (or combination of agents) can have distinct appeal functions and the appeal court can respond uniquely to each group of appeals. In order to augment the generalizability of our research we have used two distinct legal data sets: customer complaints about monopoly conditions in the Swedish electricity distribution sector and car motor injury claims in Spain. We have shown that appellate courts are affected by both the effort made by first-stage decision makers and by the complexity of the case, which illustrates the value of widening the narrowly defined focus on heterogeneity in preferences. We have also shown that appealed cases are a non-random sub-sample of litigated cases and that this nature of selectivity is captured more effectively using multi-categorical selection models.

[17] A similar interpretation is given by Ayuso et al. (2011).

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Appendix 1

Table A1. Descriptive statistics for regulatory and court decisions from the Swedish electricity distribution.

Variable	Mean	Srd.dev.	Min	Max
Stage 1 (n=337)				
UtPri	0.4510	0.4983	0	1
CustC	0.7092	0.4548	0	1
$\hat{\eta}$	-1.5×10^{-6}	185.01	-496.28	1740.7
NoPrec	30.932	24.182	1	143
Pr/Pu	0.6979	0.2466	0.1600	1.9583
LengL	266.81	253.35	0	1410
Ant	0.6979	0.24182	0	1
Days	4181.0	264.91	2346	4564
RRevTi	627.97	332.89	34	2196
Stage 2 – Customers appeal (n=41)				
$\hat{\eta}$	-4.7472	148.66	-496.28	646.97
CRevTi	304.76	102.03	133	672
NoPrec	21.610	8.1880	5	61
ThreeL	0.2439	0.4348	0	1
DM1	0.7561	0.4348	0	1
DM2	0.1707	0.3809	0	1
NoDec	105.66	78.857	1	272
Stage 2 – Utilities appeal (n=132)				
$\hat{\eta}$	24.627	214.93	-227.65	1740.8
CRevTi	315.68	110.30	120	994
NoPrec	24.864	11.044	1	72
ThreeL	0.4924	0.5018	0	1
DM1	0.7576	0.4302	0	1
DM2	0.0985	0.2991	0	1
NoDec	105.87	81.036	1	276
Stage 2 – Customers and Utilities appeal (n=60)				
$\hat{\eta}$	5.9738	96.345	-323.71	162.97
CRevTi	314.65	73.492	134	469
NoPrec	25.967	8.3096	19	68
ThreeL	0.2500	0.4367	0	1
DM1	0.9000	0.3025	0	1
DM2	0.1000	0.3025	0	1
NoDec	116.58	79.232	3	270

Table A2. Regression output from eq. (4).

Variable [a]	Mean (SE)	
NoPrec	2.3027 (0.6596)	***
UtPri	16.448 (33.277)	
ThreeL	-34.475 (33.335)	
NoDec	-0.4217 (0.1992)	**
DM1	124.85 (57.442)	**
DM2	248.65 (64.163)	***
Ant	-3686.7 (461.24)	***
Day	-0.2122 (0.0738)	***
Ant×Day	1.0115 (0.1105)	***
Constant	999.34 (260.22)	***
R^2	0.691	
No. obs.	337	

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

[a] Total regulatory review time (*RRevTi*) is dependent variable.

Table A3. Descriptive statistics of explanatory variables in the Spanish modelling application

Variable	Mean	Srd.dev.	Min	Max
Stage 1 (n=202)				
Fault	0.163	0.371	0	1
Time	1.564	1.0164	0	8
Sever	-1.389	8.367	-86	19
System	0.480	0.501	0	1
Comp	8,936	17,037	0	159,747
Inter	0.158	0.366	0	1
Stage 2 (n=32)				
Fault	0.125	0.336	0	1
Sever	-6.750	18.701	-86	0
System	0.437	0.504	0	1
Inter	0.500	0.508	0	1

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