Appendix Roadmap

The appendix is composed of eight sections. Appendix A discusses difficulties related to the lack of legal representation, Appendix B contains a table of notation, Appendix C, D, and E respectively contain proofs corresponding to Sections 3, 4, and 5. Appendix F contains a supplementary discussion related to Section 6. Appendix G contains supplementary materials to Section 7 and Appendix H contains two analytical properties, and their proofs, which are used throughout. Due to the page limit for online appendices, Appendices G and H are are posted online at `https://github.com/df365/Freund_ElectronicSupplements/blob/main/Docket_OnlineSupplement.pdf`.

Appendix A: Difficulties related to the lack of legal representation

In this appendix we provide additional background information on the difficulties associated to asylees not having access to legal representation. A frequent difficulty is *removal in absentia*, i.e., removal due to a failure to appear in court. HIRC reports that 24% of cases on Boston's dedicated docket are removed in absentia. Most of the families removed in absentia do not have representation: 76.6% in Boston (Murphy et al. 2023) and 86.6% in L.A. (Kim et al. 2022). One of the key reasons for failure to appear, is that families without representation find it difficult to navigate the court. The IRPC report recounts how a family was ordered removed in absentia despite being in the right building at the right time:

> "*William and his 6-year-old son were ordered removed for failing to show up in court, despite the fact that they spent seven hours waiting in the lobby of the court building on the day of their hearing. An immigration officer simply failed to explain to them that they needed to go upstairs to the courtroom.*" – Kim et al. (2022).

The report suggests that such situations, that could be clarified through a quick conversation, are not infrequent, and can often result in a removal order.

Another difficulty that arises without representation is that once ordered removed in absentia, the only way to continue a case is to file a motion to reopen. However, such a motion has strict requirements and is inaccessible to "many families on the Dedicated Docket . . . particularly those without representation." (Murphy et al. 2023).

Appendix B: Table of Notation in Alphabetical Order

Notation	Meaning
$\textsc{Acc}(\boldsymbol{P},\tau)$	accuracy of the two-docket system under the PM's decision $\boldsymbol{P},\tau$
$\textsc{Acc}^{\Omega}(q)$	two-docket system's Pareto frontier when the PM's decision is in Ω
$\textsc{Acc}^{\text{SD}}(q)$	single-docket system's speed-accuracy Pareto frontier
$\boldsymbol{b}=(b_{\text{I}})_{\text{I}\in\{\text{R},\text{D}\}}$	lawyers' allocated effort to each docket
$\boldsymbol{b}^{\star}$	an optimal effort allocation
$\mathcal{B}(\boldsymbol{P},\tau)$	set of feasible effort allocations
$C_{\text{I}}^{(\boldsymbol{P},\tau)}(\boldsymbol{r},T)$	number of docket-I cases fully prepared by lawyers in time $[0,T)$
$C_{\text{I}}^{(\boldsymbol{P},\tau)}(\boldsymbol{r})$	long-run average of the above quantity, derived in (8)
$\tilde{C}^{\kappa}(r_{\text{SD}},T)$	number of cases fully prepared by lawyers in the single docket in $[0,T)$
η	speedup of the dedicated docket
ε	court's capacity slackness, defined by $\kappa-\lambda$
$f(x)$	helper function for analysis defined as $f(x)=xe^{-x}/(1-e^{-x})$

$\mathcal{K}$	set of asylees' types
κ	court's fixed capacity
$\kappa_{\text{I}}(\boldsymbol{P},\tau)$	court's optimal capacity for docket I in (Court's Optimization)
λ	asylees' arrival rate
$\lambda_{\text{I}}(\boldsymbol{P})$	asylees' arrival rate to docket I under routing decision $\boldsymbol{P}$
$\mu_{\text{I}}(\boldsymbol{P},\tau)$	lawyers' service rate of docket-I cases given by (6)
n	upper bound of the lawyers' average number of active cases
$\bar{N}((\boldsymbol{P},\tau),\boldsymbol{r})$	lawyers' average number of active cases in the two-docket system
$\bar{N}(\kappa, r_{\text{SD}})$	number of active cases in the single docket
p_k	probability of type-k asylees
$p_{\text{I}}(\boldsymbol{P})$	fraction of asylees routed to docket I
$\boldsymbol{P}=(p_{k,\text{I}})_{k\in\mathcal{K},\text{I}\in\{\text{R,D}\}}$	PM's routing probability of a type-k asylee to docket I
$q(\boldsymbol{P},\tau)$	two-docket system's queue length under the PM's decision $\boldsymbol{P},\tau$
$q_{\min}$	minimum possible queue length of the two-docket system
r_{SD}	lawyers' admission probability for the single docket
$\rho_{\text{I}}(\boldsymbol{P},\tau)$	lawyers' workload of docket-I cases given by $\lambda_{\text{I}}(\boldsymbol{P})/(n\mu_{\text{I}}(\boldsymbol{P},\tau))$
$\bar{\rho}$	lawyers' inherent workload, defined by $\lambda s/n$
$\boldsymbol{r}=(r_{\text{I}})_{\text{I}\in\{\text{R,D}\}}$	lawyers' admission policy (admit a docket-I case with probability r_{I})
s	time for lawyers to fully prepare a case
τ	delay target of the dedicated docket set by PM
$\theta_{\text{I}}(\boldsymbol{P},\tau)$	inverse of the expected sojourn time in docket I
$u((\boldsymbol{P},\tau),\boldsymbol{r})$	lawyers' utility under admission policy $\boldsymbol{r}$, defined by (1)
$u(\boldsymbol{P},\tau)$	lawyers' (optimal) utility under PM's decision $\boldsymbol{P},\tau$ given by (11)
$\tilde{u}(\kappa)$	lawyers' utility in the single docket with capacity κ
$u^{\text{SD}}(q)$	lawyers' utility in the single docket with queue length q
v_a	indicator of whether asylee a merits asylum
$\bar{v}_k$	probability of a type-k asylee meriting asylum
$\bar{v}_{\text{I}}(\boldsymbol{P})$	average probability of meeting asylum criteria for cases in docket I

Appendix C: Proofs of Results in Section 3

C.1. Feasibility of the court's optimization (Proposition 1)

Proof of Proposition 1. If $\tau \le \frac{1}{(1+\eta)\varepsilon+\lambda p_{\text{D}}(\boldsymbol{P})\eta}$, then $\kappa_{\text{D}} \ge \lambda p_{\text{D}} + 1/\tau \ge (1+\eta)(\varepsilon+\lambda p_{\text{D}})$ and thus

$$\kappa_{\text{R}} \le \kappa - \kappa_{\text{D}}/(1+\eta) \le \kappa - \varepsilon - \lambda p_{\text{D}} = \lambda_{\text{R}}(\boldsymbol{P}), \quad \text{which is infeasible.}$$

The other direction follows by setting $\kappa_{\text{D}} = \lambda p_{\text{D}} + 1/\tau$ and $\kappa_{\text{R}} = \kappa - \kappa_{\text{D}}/(1+\eta)$. $\square$

C.2. Optimal capacity allocation of the court (Proposition 2)

Proof of Proposition 2. Fix $\boldsymbol{P},\tau$ and consider (Court's Optimization). For ease of exposition, we omit dependence on $\boldsymbol{P},\tau$ when clear from the context. For a feasible pair $(\kappa_{\text{R}},\kappa_{\text{D}})$ to the optimization problem, if $\kappa_{\text{D}}/(1+\eta)+\kappa_{\text{R}} < \kappa$, we can increase either of them to reduce the total queue length while the pair remains feasible. This implies that any optimal solution to (Court's Optimization) fulfills $\kappa_{\text{D}}/(1+\eta)+\kappa_{\text{R}} = \kappa$. For ease of notation, we substitute $\kappa_{\text{R}} = \lambda_{\text{R}} + x$ for some $x > 0$, and thus

$$\kappa_{\text{D}} - \lambda_{\text{D}} = (1+\eta)(\kappa-\kappa_{\text{R}}) - \lambda_{\text{D}} = (1+\eta)(\lambda+\varepsilon-\lambda_{\text{R}}-x) - \lambda_{\text{D}} = (1+\eta)(\varepsilon-x) + \eta\lambda_{\text{D}} = \delta - (1+\eta)x$$

where we recall $\delta = (1+\eta)\varepsilon + \lambda p_{\mathrm{D}}\eta = (1+\eta)\varepsilon + \eta\lambda_{\mathrm{D}}$. The (Court's Optimization) is then equivalent to

$$\lambda \min_{x>0} \frac{p_{\mathrm{R}}}{x} + \frac{p_{\mathrm{D}}}{\delta-(1+\eta)x}, \quad \text{s.t.} \quad \delta-(1+\eta)x \geq 1/\tau. \tag{14}$$

To find the optimal solution $x^\star$ within the feasible region $(0, \delta/(1+\eta) - 1/(\tau(1+\eta))]$, we define $g(x) = \frac{p_{\mathrm{R}}}{x} + \frac{p_{\mathrm{D}}}{\delta-(1+\eta)x}$. Its derivative is given by

$$g'(x) = \frac{p_{\mathrm{D}}(1+\eta)^2x^2 - p_{\mathrm{R}}(\delta-(1+\eta)x)^2}{(\delta-(1+\eta)x)^2x^2}.$$

Setting $g'(x) = 0$ gives $\frac{(1+\eta)x}{\delta-(1+\eta)x} = \sqrt{p_{\mathrm{R}}/p_{\mathrm{D}}}$. We denote the right-hand side by $\gamma = \sqrt{p_{\mathrm{R}}/p_{\mathrm{D}}}$. As a result, the unique stationary point of $g(x)$ is

$$\tilde{x} = \frac{\gamma\delta}{(1+\gamma)(1+\eta)} = \frac{1}{1+\eta}(\delta - \frac{\delta}{1+\gamma}).$$

Furthermore, $g'(x)$ is strictly negative for $(0,\tilde{x})$ and strictly positive for $(\tilde{x}, \delta/(1+\eta))$. Therefore, if $\tilde{x}$ is feasible to (14), then it is the unique optimal solution $x^\star$. It is feasible if and only if

$$\delta-(1+\eta)\tilde{x} \geq 1/\tau \Leftrightarrow \frac{\delta}{1+\gamma} \geq 1/\tau \Leftrightarrow \tau \geq \frac{1+\gamma}{\delta}.$$

We have thus proven that for $\tau \geq (1+\gamma)/\delta$, $\kappa_{\mathrm{R}} = \lambda_{\mathrm{R}} + \tilde{x} = \lambda_{\mathrm{R}} + \frac{\gamma\delta}{(1+\gamma)(1+\eta)}$ and $\kappa_{\mathrm{D}} = \lambda_{\mathrm{D}} + \delta - (1+\eta)\tilde{x} = \lambda_{\mathrm{D}} + \frac{\delta}{1+\gamma}$, which proves the first case of Proposition 2.

For the second case ($\tilde{x}$ is too large to be feasible), we use that $g'(x)$ is strictly negative for $x \in (0,\tilde{x})$ and thus the optimal solution to (14) is at the boundary of the feasible region, i.e., $x^\star = \delta/(1+\eta) - 1/(\tau(1+\eta))$. Therefore, $\kappa_{\mathrm{R}} = \lambda_{\mathrm{R}} + \frac{\delta}{1+\eta} - \frac{1}{\tau(1+\eta)}$ and $\kappa_{\mathrm{D}} = \lambda_{\mathrm{D}} + \frac{1}{\tau}$, which concludes the proof of the proposition. □

C.3. Lawyers' best response (Proposition 3)

In this appendix we derive the expression of $\mu_{\mathrm{I}}(\boldsymbol{P},\tau)$ used in Section 3.2 and prove Proposition 3.

Derivation of $\mu_{\mathrm{I}}(\boldsymbol{P},\tau)$. Without abandonment, each case would remain with a lawyer for exactly the deterministic preparation time s. This time can be cut short when an asylee abandons the lawyers, i.e., when the court date occurs before the lawyers complete their preparation. Therefore, when lawyers admit an asylee's case, it remains with the lawyers for the minimum of (i) s and (ii) the time $X_{\mathrm{I}}(\boldsymbol{P},\tau)$ until the court date when the asylee abandons the lawyers. The latter has distribution $\textsc{Exp}(\theta_{\mathrm{I}}(\boldsymbol{P},\tau))$ since the asylees' sojourn time in the court system has distribution $\textsc{Exp}(\theta_{\mathrm{I}}(\boldsymbol{P},\tau))$ and the lawyers' admission decisions are independent of an asylee's sojourn time. As a result, the service rate $\mu_{\mathrm{I}}(\boldsymbol{P},\tau)$ is

$$\mu_{\mathrm{I}}(\boldsymbol{P},\tau) = \frac{1}{\mathbb{E}\left[\min\{s, X_{\mathrm{I}}(\boldsymbol{P},\tau)\}\right]} = \frac{\theta_{\mathrm{I}}(\boldsymbol{P},\tau)}{1-\exp(-s\theta_{\mathrm{I}}(\boldsymbol{P},\tau))}. \tag{15}$$

Proof of Proposition 3. We fix $\boldsymbol{P}$ and τ and omit the dependence on them for simplicity. By definition, an effort allocation $\boldsymbol{b}$ is feasible in (11) if and only if $b_{\mathrm{I}} \leq \rho_{\mathrm{I}}$ for any I and $b_{\mathrm{D}} + b_{\mathrm{R}} \leq 1$. Consider first the case that $\rho_{\mathrm{R}} + \rho_{\mathrm{D}} \leq 1$. Then, as $\bar{v}_{\mathrm{I}} f(s\theta_{\mathrm{I}})$ is positive for both dockets I, the unique optimal solution to (11) maximizes b_{I}, i.e., it sets $b_{\mathrm{I}} = \rho_{\mathrm{I}}$ for $\mathrm{I} \in \{\mathrm{R}, \mathrm{D}\}$. This matches the form of $\boldsymbol{b}^\star$ in Proposition 3 for $\rho_{\mathrm{R}} + \rho_{\mathrm{D}} \leq 1$.

For the case $\rho_{\mathrm{R}} + \rho_{\mathrm{D}} > 1$ and $\bar{v}_{\mathrm{R}} f(s\theta_{\mathrm{R}}) \neq \bar{v}_{\mathrm{D}} f(s\theta_{\mathrm{D}})$, the optimal solution to (11) is to have $b_{\mathrm{I}+}$ as large as possible as it strictly increases utility compared to a higher $b_{\mathrm{I}-}$. The resulting unique optimal solution is $b^\star_{\mathrm{I}+} = \min\{\rho_{\mathrm{I}+}, 1\}$, which leaves the remaining capacity to I^-, i.e., $b^\star_{\mathrm{I}-} = 1 - b^\star_{\mathrm{I}+} = \min\{\rho_{\mathrm{I}-}, 1 - b^\star_{\mathrm{I}+}\}$. □

C.4. Pareto frontier of the single-docket benchmark (Proposition 4)

Proof of Proposition 4. We fix the PM's capacity decision $\kappa > \lambda$ and calculate the long-run utility $\tilde{u}(\kappa)$ in (3). Since asylees abandon the lawyers at rate $\kappa - \lambda$, following (6) gives the service rate of lawyers, which is equal to $\mu(\kappa) = \frac{\kappa-\lambda}{1-\exp(-s(\kappa-\lambda))}$. The lawyers' workload is then

$$\rho(\kappa) = \frac{\lambda}{n\mu(\kappa)} = \frac{\lambda}{\kappa - \lambda} \cdot \frac{1 - \exp(-s(\kappa - \lambda))}{n}. \tag{16}$$

Similar to the derivation for (11), we can rewrite the long-run utility $\tilde{u}(\kappa)$ in (3) as

$$\tilde{u}(\kappa) = n \max_{b_{\mathrm{SD}} \in [0,1], b_{\mathrm{SD}} \leq \rho(\kappa)} b_{\mathrm{SD}} \bar{v} f(s(\kappa - \lambda))/s = \bar{v} n \min(1, \rho(\kappa)) f(s(\kappa - \lambda))/s. \tag{17}$$

Having the queue length $\lambda/(\kappa - \lambda) = q$ for a fixed value $q > 0$ uniquely identifies $\kappa = \lambda(1 + 1/q) > \lambda$. For any $q > 0$, the lawyers' corresponding workload in a single-docket system is

$$\rho^{\mathrm{SD}}(q) = q(1 - \exp(-s\lambda/q))/n, \tag{18}$$

and the corresponding lawyers' effort is $b^{\mathrm{SD}}(q) = \min\{1, \rho^{\mathrm{SD}}(q)\} = \min\{1, q(1 - \exp(-s\lambda/q))/n\}$. (19)

Therefore, the long-run average completion rate of asylees' cases is

$$C^{\mathrm{SD}}(q) = n b^{\mathrm{SD}}(q) f(s\lambda/q)/s = n \min\{1, q\big(1 - \exp(-s\lambda/q)\big)/n\} f(s\lambda/q)/s. \tag{20}$$

Using $u^{\mathrm{SD}}(q) = \bar{v} C^{\mathrm{SD}}(q)$ and $f(x) = \frac{xe^{-x}}{1-e^{-x}}$ gives

$$u^{\mathrm{SD}}(q) = \begin{cases} \bar{v}\lambda \exp(-s\lambda/q) & \text{if } q(1 - \exp(-s\lambda/q)) < n \\ \bar{v} n f(s\lambda/q)/s & \text{otherwise.} \end{cases} \tag{21}$$

Since $\textsc{Acc}^{\mathrm{SD}}(q) = (1 - \bar{v}) + u^{\mathrm{SD}}(q)/\lambda$, this shows the form of $\textsc{Acc}^{\mathrm{SD}}(q)$ in the result.

To show $\textsc{Acc}^{\mathrm{SD}}(q)$ is strictly increasing, it suffices to show that $u^{\mathrm{SD}}(q)$ is strictly increasing. Let $x = s\lambda/q$, and observe that the function $(1 - e^{-x})/x = (1 - e^{-s\lambda/q})q/s\lambda$ is strictly decreasing in x (Fact 3, Appendix H) and thus strictly increasing in q. Therefore, $q(1 - \exp(-s\lambda/q))$ is also strictly increasing in q. Since $f(s\lambda/q)$ is strictly increasing in q (Fact 2, Appendix H), we find that

$$u^{\mathrm{SD}}(q) = \bar{v} n \min\{1, q\big(1 - \exp(-s\lambda/q)\big)/n\} f(s\lambda/q)/s$$

is strictly increasing in q. We thus establish that $\textsc{Acc}^{\mathrm{SD}}(q)$ is strictly increasing in q. The upper bound on $\textsc{Acc}^{\mathrm{SD}}(q)$ in Proposition 4 follows by replacing the min operator in $u^{\mathrm{SD}}(q)$ with 1. □

Appendix D: Proofs of Results in Section 4

D.1. A sufficient condition for utility/accuracy improvement (Lemma 1)

Proof of Lemma 1. Fix any decision $(\boldsymbol{P},\tau)$ that satisfies the lemma conditions. Since $\bar{v}_{\mathrm{R}}(\boldsymbol{P}) = \bar{v}_{\mathrm{D}}(\boldsymbol{P})$, both of them must be equal to the average asylum probability $\bar{v}$. Then, (11) implies $u(\boldsymbol{P},\tau) = \frac{n\bar{v}}{s}\max_{\boldsymbol{b}\in\mathcal{B}(\boldsymbol{P},\tau)}\sum_{\mathrm{I}\in\{\mathrm{R},\mathrm{D}\}} b_{\mathrm{I}} f(s\theta_{\mathrm{I}}(\boldsymbol{P},\tau))$. Comparing this utility form to the corresponding single-docket utility $u^{\mathrm{SD}}(q(\boldsymbol{P},\tau))$ shows

$$
\begin{aligned}
u(\boldsymbol{P},\tau) - u^{\mathrm{SD}}(q(\boldsymbol{P},\tau)) &\geq \frac{n\bar{v}}{s}\Big(\max_{\boldsymbol{b}\in\mathcal{B}(\boldsymbol{P},\tau)}\sum_{\mathrm{I}\in\{\mathrm{R},\mathrm{D}\}} b_{\mathrm{I}} f(s\theta_{\mathrm{I}}(\boldsymbol{P},\tau)) - f(s\lambda/q(\boldsymbol{P},\tau))\Big) && \text{(By (21))}\\
&\geq \frac{n\bar{v}}{s}\Big(\min\{\rho_{\mathrm{R}}(\boldsymbol{P},\tau),1\} f(s\theta_{\mathrm{R}}(\boldsymbol{P},\tau)) - f(s\lambda/q(\boldsymbol{P},\tau))\Big)\\
& && \text{(With } b_{\mathrm{D}}=0, b_{\mathrm{R}}=\min\{\rho_{\mathrm{R}}(\boldsymbol{P}^\star,\tau),1\}\text{)}\\
&= \frac{n\bar{v}}{s}\left(f(s\theta_{\mathrm{R}}(\boldsymbol{P},\tau)) - f\left(\frac{s}{p_{\mathrm{D}}(\boldsymbol{P})/\theta_{\mathrm{D}}(\boldsymbol{P},\tau) + p_{\mathrm{R}}(\boldsymbol{P})/\theta_{\mathrm{R}}(\boldsymbol{P},\tau)}\right)\right) && (22)
\end{aligned}
$$

where the second inequality is because restricting lawyers to only serve asylees on the regular docket only decreases the utility, and the last equality is by (5) and the lemma assumption $\rho_{\mathrm{R}}(\boldsymbol{P},\tau) \geq 1$. As $f(\cdot)$ is strictly decreasing (Fact 2, Appendix H) we thus prove that $u(\boldsymbol{P},\tau) - u^{\mathrm{SD}}(q(\boldsymbol{P},\tau) > 0$ by instead showing that $s\theta_{\mathrm{R}}(\boldsymbol{P},\tau) < \frac{s}{p_{\mathrm{D}}(\boldsymbol{P})/\theta_{\mathrm{D}}(\boldsymbol{P},\tau)+p_{\mathrm{R}}(\boldsymbol{P})/\theta_{\mathrm{R}}(\boldsymbol{P},\tau)}$. We use $1-p_{\mathrm{R}}(\boldsymbol{P}) = p_{\mathrm{D}}(\boldsymbol{P})$ and the lemma assumption that $\theta_{\mathrm{R}}(\boldsymbol{P},\tau) < \theta_{\mathrm{D}}(\boldsymbol{P},\tau)$ to obtain this result as follows:

$$
\begin{aligned}
s\theta_{\mathrm{R}}(\boldsymbol{P},\tau) < \frac{s}{p_{\mathrm{D}}(\boldsymbol{P})/\theta_{\mathrm{D}}(\boldsymbol{P},\tau)+p_{\mathrm{R}}(\boldsymbol{P})/\theta_{\mathrm{R}}(\boldsymbol{P},\tau)} &\Leftrightarrow \frac{p_{\mathrm{D}}(\boldsymbol{P})}{\theta_{\mathrm{D}}(\boldsymbol{P},\tau)} + \frac{p_{\mathrm{R}}(\boldsymbol{P})}{\theta_{\mathrm{R}}(\boldsymbol{P},\tau)} < \frac{1}{\theta_{\mathrm{R}}(\boldsymbol{P},\tau)}\\
&\Leftrightarrow \frac{p_{\mathrm{D}}(\boldsymbol{P})}{\theta_{\mathrm{D}}(\boldsymbol{P},\tau)} < \frac{1-p_{\mathrm{R}}(\boldsymbol{P})}{\theta_{\mathrm{R}}(\boldsymbol{P},\tau)} \Leftrightarrow \theta_{\mathrm{R}}(\boldsymbol{P},\tau) < \theta_{\mathrm{D}}(\boldsymbol{P},\tau). \quad \square
\end{aligned}
$$

D.2. The regular docket is slower than the dedicated docket (Lemma 2)

Proof of Lemma 2. Our construction gives $p^\star_{\mathrm{R}} = 2/\bar{\rho} < 1/2$ and thus $p^\star_{\mathrm{D}} > 1/2$. In addition, $(\boldsymbol{P}^\star,\tau) \in \Omega_{\mathrm{EFF}}$ implies $\tau < \frac{1+\gamma(\boldsymbol{P}^\star)}{\delta(\boldsymbol{P}^\star)} < \frac{2}{\delta(\boldsymbol{P}^\star)}$ because $\gamma(\boldsymbol{P}^\star) = \sqrt{p^\star_{\mathrm{R}}/p^\star_{\mathrm{D}}} < 1$. Therefore, $\delta(\boldsymbol{P}^\star) < 2/\tau$. Combining this with the values of $\theta_{\mathrm{R}}(\boldsymbol{P}^\star,\tau)$ and $\theta_{\mathrm{D}}(\boldsymbol{P}^\star,\tau)$ implied by the court's capacity decision in Proposition 2, we obtain

$$\theta_{\mathrm{R}}(\boldsymbol{P}^\star,\tau) = (\delta(\boldsymbol{P}^\star) - 1/\tau)/(1+\eta) < 2/\tau - 1/\tau = 1/\tau = \theta_{\mathrm{D}}(\boldsymbol{P}^\star,\tau). \quad \square$$

D.3. Existence of a required delay target (Lemma 3)

We first give a sufficient condition under which lawyers are overloaded with regular docket cases. Recall from Proposition 2 that $1/\tau$ is the necessary court capacity slackness for the dedicated docket and $(\delta(\boldsymbol{P}^\star) - 1/\tau)/(1+\eta)$ is the remaining court capacity slackness for the regular docket. The following lemma states that when the capacity slackness on the regular docket is sufficiently small (due to τ being sufficiently small), then lawyers spend so much time on regular docket cases that they are overloaded without working on any dedicated-docket cases, i.e., $\rho_{\mathrm{R}}(\boldsymbol{P}^\star,\tau) \geq 1$.

LEMMA 9. *For $\boldsymbol{P}^\star$ in* (12)*, if* $\frac{1.5(1+\eta)}{s} \geq \delta(\boldsymbol{P}^\star) - \frac{1}{\tau}$ *and* $(\boldsymbol{P}^\star, \tau) \in \Omega_{\text{EFF}}$*, then* $\rho_{\text{R}}(\boldsymbol{P}^\star, \tau) \geq 1$.

Proof. By our construction of $\boldsymbol{P}^\star$, $p^\star_{\text{R}} = 2/\bar{\rho} = 2n/(\lambda s)$. In addition, since $(\boldsymbol{P}^\star, \tau) \in \Omega_{\text{EFF}}$, Proposition 2 gives $\theta_{\text{R}}(\boldsymbol{P}^\star, \tau) = \kappa_{\text{R}}(\boldsymbol{P}^\star, \tau) - \lambda_{\text{R}}(\boldsymbol{P}^\star) = (\delta(\boldsymbol{P}^\star) - 1/\tau)/(1+\eta) \leq 1.5/s$ where the last inequality is by the condition of this lemma. From that we obtain

$$\rho_{\text{R}}(\boldsymbol{P}^\star, \tau) = \frac{\lambda p^\star_{\text{R}}}{n\mu_{\text{R}}(\boldsymbol{P}^\star, \tau)} = \frac{\lambda p^\star_{\text{R}}(1 - \exp(-s\theta_{\text{R}}(\boldsymbol{P}^\star, \tau)))}{n\theta_{\text{R}}(\boldsymbol{P}^\star, \tau)} \geq \frac{\lambda s p^\star_{\text{R}}(1 - \exp(-1.5))}{1.5n} \geq \frac{2(1 - \exp(-1.5)}{1.5} \geq 1$$

for the lawyers' regular docket workload. Here, the first inequality follows from $(1 - e^{-x})/x$ is decreasing (Fact 3, Appendix H) and $\theta_{\text{R}}(\boldsymbol{P}^\star, \tau) \leq 1.5/s$, and the second from $p^\star_{\text{R}} = 2n/(\lambda s)$. $\square$

Proof of Lemma 3. Fix a queue length $\tilde{q} \in [\underline{q}, +\infty)$. As $\boldsymbol{P}^\star$ is fixed, we omit the dependence on $\boldsymbol{P}^\star$ when it is clear. Lemma 9 lets us replace the third condition, i.e., it is sufficient to establish the existence of $\tau^\star$ with (a) $(\boldsymbol{P}^\star, \tau^\star) \in \Omega_{\text{EFF}}$, (b) $q(\boldsymbol{P}^\star, \tau^\star) = \tilde{q}$, and (c) $\frac{1.5(1+\eta)}{s} \geq \delta(\boldsymbol{P}^\star) - \frac{1}{\tau^\star}$.

We distinguish between two cases depending on whether or not the inequality $\delta - 1.5(1+\eta)/s \geq \delta/(1+\gamma)$ holds. Both cases use the inequality $\gamma \leq 2/\sqrt{\bar{\rho}}$, which follows from $\gamma = \sqrt{p_{\text{R}}/p_{\text{D}}} = \sqrt{\frac{2/\bar{\rho}}{1-2/\bar{\rho}}} \geq \sqrt{2/\bar{\rho}}$ and $\bar{\rho} \geq 4$.

Case 1: $\delta - 1.5(1+\eta)/s < \delta/(1+\gamma)$. Observe that Condition (a), i.e., $(\boldsymbol{P}^\star, \tau^\star) \in \Omega_{\text{EFF}}$, is equivalent to $\tau^\star \in (1/\delta, (1+\gamma)/\delta]$ by the definition of Ω_{EFF}. In addition, in this case the condition (c) $1/\tau^\star \geq \delta - 1.5(1+\eta)/s$ is implied by Condition (a) since $1/\tau^\star \geq \delta/(1+\gamma) > \delta - 1.5(1+\eta)/s$. Thus, we need to identify a $\tau^\star$ in this range such that condition (b) is fulfilled. We define

$$q(\tau) \coloneqq \lambda \left(\frac{p_{\text{D}}}{1/\tau} + \frac{p_{\text{R}}(1+\eta)}{\delta - 1/\tau} \right) = \lambda \left(\left(1 - \frac{2}{\bar{\rho}}\right) \tau + \frac{2}{\bar{\rho}} \frac{1+\eta}{\delta - 1/\tau} \right),$$

where the second equality uses our construction of $\boldsymbol{P}^\star$. Then $q(\boldsymbol{P}^\star, \tau)$, i.e., the queue length under decision $(\boldsymbol{P}^\star, \tau)$, is equal to $q(\tau)$. Thus, we need to show that there exists $\tau^\star \in (1/\delta, (1+\gamma)/\delta]$ that fulfills $q(\tau^\star) = \tilde{q}$, guaranteeing Condition (b). We identify such $\tau^\star$ by observing that $q(\tau)$ is a continuous function and that in the limit $\tau \to (1/\delta)^+$ the queue length $q(\tau) \to +\infty$. We then bound

$$\begin{aligned}
q\left(\frac{1+\gamma}{\delta}\right) &= \lambda \left((1 - 2/\bar{\rho}) \frac{1+\gamma}{\delta} + \frac{2(1+\eta)}{\bar{\rho}} \frac{1+\gamma}{\gamma\delta} \right) \\
&\leq \frac{\lambda}{\delta} \left((1 - 2/\bar{\rho})(1 + \sqrt{4/\bar{\rho}}) + 4(1+\eta)/\sqrt{2\bar{\rho}} \right) \qquad \text{(Since } \sqrt{2/\bar{\rho}} \leq \gamma \leq 2/\sqrt{\bar{\rho}} \text{ and } \bar{\rho} > 4) \\
&\leq q_{\min} \left(1 + \frac{2 + 2\sqrt{2}(1+\eta)}{\sqrt{\bar{\rho}}} \right) \leq q_{\min} \left(1 + 4\sqrt{2}(1+\eta)/\sqrt{\bar{\rho}} \right).
\end{aligned}$$

Since $\tilde{q} \geq \underline{q} \geq q_{\min} \left(1 + 4\sqrt{2}(1+\eta)/\sqrt{\bar{\rho}}\right)$, there exists $\tau^\star \in (1/\delta, (1+\gamma)/\delta]$ with $q(\tau^\star) = \tilde{q}$.

Case 2: $\delta - 1.5(1+\eta)/s \geq \delta/(1+\gamma)$. In this case we need $\tau^\star \in \left(1/\delta, \min\left\{\frac{1+\gamma}{\delta}, \frac{1}{\delta - 1.5(1+\eta)/s}\right\}\right]$ to satisfy conditions (a) and (c) of the lemma. Following the same argument as in the last case, we only need to show $\tilde{q} \geq \max\left\{q\left(\frac{1+\gamma}{\delta}\right), q\left(\frac{1}{\delta - 1.5(1+\eta)/s}\right)\right\}$ to prove existence of $\tau^\star \in \left(1/\delta, \min\left\{\frac{1+\gamma}{\delta}, \frac{1}{\delta - 1.5(1+\eta)/s}\right\}\right]$ such that

Condition (b) holds, i.e., $q(\tau^\star) = \tilde{q}$. The above case shows that $\tilde{q} \geq \underline{q} \geq q\left(\frac{1+\gamma}{\delta}\right)$. We thus only need to upper bound

$$\begin{aligned}
q\left(\frac{1}{\delta - 1.5(1+\eta)/s}\right) &= \lambda\left((1-2/\bar{\rho})\frac{1}{\delta - 1.5(1+\eta)/s} + \frac{2}{\bar{\rho}}\frac{1+\eta}{1.5(1+\eta)/s}\right) \\
&\leq \lambda\left((1-2/\bar{\rho})\frac{1+\gamma}{\delta} + \frac{2s}{\bar{\rho}}\right) \quad \text{(by the case assumption that } \delta - 1.5(1+\eta)/s \geq \delta/(1+\gamma)) \\
&\leq \frac{\lambda}{\delta}(1+\gamma) + 2n \qquad \text{(by } \bar{\rho} = \tfrac{\lambda s}{n} \text{ and } 1 - 2/\bar{\rho} < 1) \\
&\leq (1 + 2/\sqrt{\rho})q_{\min} + 2n. \qquad \text{(by } \gamma \leq 2/\sqrt{\rho})
\end{aligned}$$

Since $\underline{q} \geq (1+2/\sqrt{\rho})q_{\min} + 2n \geq q\left(\frac{1}{\delta - 1.5(1+\eta)/s}\right)$, we have $\tilde{q} \geq \underline{q} \geq \max\left\{q\left(\frac{1+\gamma}{\delta}\right), q\left(\frac{1}{\delta - 1.5(1+\eta)/s}\right)\right\}$.

Summarizing the above two cases, as long as $\tilde{q} \geq \underline{q}$, there exists a $\tau^\star$ that satisfies conditions (a)-(c) of the lemma, which finishes the proof. $\square$

Appendix E: Proofs of Results in Section 5

E.1. Auxiliary results

Our proofs of Lemmas 4, 6, and 11 rely on two additional auxiliary results. Denoting the workload of lawyers in a single-docket system with queue length q by $\rho^{\mathrm{SD}}(q) = q(1 - \exp(-s\lambda/q))/n$ (see (18)), the first lemma shows that the workload of lawyers in a two-docket system under $(\boldsymbol{P}, \tau)$ is no greater than that in a single docket with the same queue length.

LEMMA 10. *The two-docket system has workload* $\rho_{\mathrm{R}}(\boldsymbol{P},\tau) + \rho_{\mathrm{D}}(\boldsymbol{P},\tau) \leq \rho^{\mathrm{SD}}(q(\boldsymbol{P},\tau))$.

Proof. We fix $\boldsymbol{P}, \tau$ and omit the dependence on them. By definition, $\rho_{\mathrm{I}} = \frac{\lambda_{\mathrm{I}}}{n\mu_{\mathrm{I}}}$. Substituting the characterization of μ_{I} for $\mathrm{I} \in \{\mathrm{R}, \mathrm{D}\}$ in (6), we can write the workload ρ_{I} as

$$\rho_{\mathrm{I}} = \frac{\lambda p_{\mathrm{I}}}{n\mu_{\mathrm{I}}} = \frac{\lambda p_{\mathrm{I}}(1 - \exp(-s\theta_{\mathrm{I}}))}{n\theta_{\mathrm{I}}} = (s\lambda/n)p_{\mathrm{I}}g(1/(s\theta_{\mathrm{I}})) \tag{23}$$

where we denote $g(x) = x(1 - \exp(-1/x))$. With $g'(x) = \frac{-(1+x)\exp(-1/x)+x}{x}$ and $g''(x) = -\exp(-1/x)/x^3 < 0$ for $x > 0$, the function $g(x)$ is concave for $x > 0$. The concavity of $g(x)$ implies the inequality in

$$\rho_{\mathrm{R}} + \rho_{\mathrm{D}} = (s\lambda/n)(p_{\mathrm{R}}g(1/s\theta_{\mathrm{R}}) + p_{\mathrm{D}}g(1/s\theta_{\mathrm{D}})) \leq (s\lambda/n)g(p_{\mathrm{R}}/s\theta_{\mathrm{R}} + p_{\mathrm{D}}/s\theta_{\mathrm{D}}). \tag{24}$$

In addition,

$$\begin{aligned}
\rho^{\mathrm{SD}}(q(\boldsymbol{P},\tau)) &= q(\boldsymbol{P},\tau)(1 - \exp(-s\lambda/q(\boldsymbol{P},\tau)))/n \qquad \text{(By (18))} \\
&= (s\lambda/n)(q(\boldsymbol{P},\tau)/s\lambda)(1 - \exp(-s\lambda/q(\boldsymbol{P},\tau))) \\
&= (s\lambda/n)g(q(\boldsymbol{P},\tau)/s\lambda) \\
&\overset{(5)}{=} (s\lambda/n)g(p_{\mathrm{R}}/s\theta_{\mathrm{R}} + p_{\mathrm{D}}/s\theta_{\mathrm{D}}) \qquad (25) \\
&\overset{(24)}{\geq} \rho_{\mathrm{R}} + \rho_{\mathrm{D}}, \text{ which finishes the proof.} \quad \square
\end{aligned}$$

The second result identifies two analytical properties of the function $h(x) = f(1/x)$.

Fact 1 *The function $h(x) = f(1/x) = \frac{\exp(-1/x)}{x(1-\exp(-1/x))}$ (i) is convex-concave in $(0,+\infty)$, i.e., there exists $x_0 \in (0,+\infty)$ such that $h'(x)$ strictly increases in $(0,x_0]$ and $h'(x)$ strictly decreases in $[x_0,+\infty)$; (ii) $h(x)/h'(x)$ strictly increases in $(0,+\infty)$.*

Proof. The first result follows by obtaining the second derivative

$$h''(x) = \frac{2x^2\exp(-3/x) - (4x^2-4x-1)\exp(-2/x) + (2x^2-4x+1)\exp(-1/x)}{x^5(1-\exp(-1/x))^3},$$

which is positive for $x > 0$ if and only if the numerator

$$\tilde{h}(x) = 2x^2\exp(-3/x) - (4x^2-4x-1)\exp(-2/x) + (2x^2-4x+1)\exp(-1/x) > 0$$

since $x^5(1-\exp(-1/x))^3 > 0$ for $x > 0$. Since $\tilde{h}(x)$ has only one root for $x > 0$, which occurs at $x_0 > 0.3$,[1] $h''(x)$ has only one root $x_0 > 0.3$ over $x > 0$. Furthermore, since $h''(0.1) > 0$ and $h''(0.4) < 0$, we have $h''(x) > 0$ for $x \in (0,x_0)$ and $h''(x) < 0$ for $x \in (x_0,+\infty)$ by continuity. As a result, $h'(x)$ strictly increases in $(0,x_0]$ and strictly decreases in $[x_0,+\infty)$, which proves (i).

For (ii), note that $h'(x) = \frac{\exp(-1/x)(1-x+x\exp(-1/x))}{x^3(1-\exp(-1/x))^2}$ and thus

$$r(x) := \frac{h(x)}{h'(x)} = \frac{x^2(1-\exp(-1/x))}{1-x+x\exp(-1/x)}.$$

To show $r(x)$ strictly increases in $(0,+\infty)$, it is sufficient to show that $r'(x) > 0$ for $x > 0$. The derivative is given by

$$r'(x) = \frac{2x - x^2 + (2x^2-2x-1)\exp(-1/x) - x^2\exp(-2/x)}{(1-x+x\exp(-1/x))^2}.$$

Since the denominator is positive for $x > 0$, we need to show that the numerator is positive. With $y = 1/x$ the numerator can be rewritten as

$$\begin{aligned}&\frac{2}{y} - \frac{1}{y^2} + \frac{2\exp(-y)}{y^2} - \frac{2\exp(-y)}{y} - \exp(-y) - \frac{\exp(-2y)}{y^2}\\ =&\frac{1}{y^2}\underbrace{\left(2y - 1 + 2\exp(-y) - 2y\exp(-y) - y^2\exp(-y) - \exp(-2y)\right)}_{b(y)}.\end{aligned}$$

Showing $r'(x) > 0$ for any $x > 0$ is now equivalent to show that $b(y) > 0$ for any $y > 0$. Given that

$$b'(y) = 2(1-\exp(-y))^2 + y^2\exp(-y) > 0$$

and $b(0) = 0$, we obtain $b(y) > b(0) = 0$ for any $y > 0$, which guarantees $r'(x) > 0$ for $x > 0$. Thus, $\frac{h}{h'(x)}$ strictly increases for $x > 0$. $\square$

[1] `http://tinyurl.com/yk2ku3wr`

E.2. A two-docket system with equal speed cannot improve a single-docket if lawyers are not overloaded (Lemma 4)

Proof of Lemma 4. For ease of exposition we omit the dependence on $\boldsymbol{P},\tau$. Since $\rho_{\mathrm{R}}+\rho_{\mathrm{D}}\le 1$, Proposition 3 shows that (11) has a unique optimal solution $\boldsymbol{b}^\star$ where $b^\star_{\mathrm{R}}=\rho_{\mathrm{R}}$ and $b^\star_{\mathrm{D}}=\rho_{\mathrm{D}}$. In addition, as we assume $\theta_{\mathrm{R}}=\theta_{\mathrm{D}}$, by (5), the queue length is $q=\lambda/\theta_{\mathrm{R}}$. Hence, the load of the single-docket system satisfies (by (18))

$$\rho^{\mathrm{SD}}(q)=q(1-\exp(-s\lambda/q))/n=\lambda(1-\exp(-s\theta_{\mathrm{R}}))/(n\theta_{\mathrm{R}})=\rho_{\mathrm{R}}+\rho_{\mathrm{D}}\le 1,$$

where the second equality substitutes $q=\lambda/\theta_{\mathrm{R}}$ and the third equality substitutes $\lambda=\lambda_{\mathrm{R}}+\lambda_{\mathrm{D}}$. Therefore, we are in the first case of Proposition 4 and obtain that the lawyers' utility in the single docket is given by $u^{\mathrm{SD}}(q)=\bar{v}\lambda\exp(-s\theta_{\mathrm{R}})$. As a result,

$$\begin{aligned}
u(\boldsymbol{P},\tau)&=n\sum_{\mathrm{I}} b^\star_{\mathrm{I}}\bar{v}_{\mathrm{I}}f(s\theta_{\mathrm{I}})/s && \text{(By (11))}\\
&=n\sum_{\mathrm{I}}\bar{v}_{\mathrm{I}}\frac{\lambda p_{\mathrm{I}}(1-\exp(-s\theta_{\mathrm{I}}))}{n\theta_{\mathrm{I}}}\cdot\frac{s\theta_{\mathrm{I}}\exp(-s\theta_{\mathrm{I}})}{1-\exp(-s\theta_{\mathrm{I}})}/s && \left(b^\star_{\mathrm{I}}=\rho_{\mathrm{I}}=\tfrac{\lambda p_{\mathrm{I}}(1-\exp(-s\theta_{\mathrm{I}}))}{n\theta_{\mathrm{I}}}\right)
\end{aligned}$$

$$=\lambda\sum_{\mathrm{I}}\bar{v}_{\mathrm{I}}p_{\mathrm{I}}\exp(-s\theta_{\mathrm{I}})=\bar{v}\lambda\exp(-s\theta_{\mathrm{R}})=u^{\mathrm{SD}}(q(\boldsymbol{P},\tau)),\ \text{which implies } \textsc{Acc}(\boldsymbol{P},\tau)=\textsc{Acc}^{\mathrm{SD}}(q(\boldsymbol{P},\tau)).\quad\square$$

E.3. Proportional effort allocation characterizes the accuracy under EIE (Lemma 5)

Proof of Lemma 5. We distinguish by whether or not (Indiff. Condition) holds.

Case 1: (Indiff. Condition) *does not hold (lawyers strictly prefer one docket).* Since lawyers are overloaded, Proposition 3 guarantees that the optimal effort allocation vector $\boldsymbol{b}^\star$ fulfills $b^\star_{\mathrm{I}+}=\min\{\rho_{\mathrm{I}+},1\}$ for the (preferred) docket $\mathrm{I}^+=\arg\max_{\mathrm{I}\in\{\mathrm{R},\mathrm{D}\}}\bar{v}_{\mathrm{I}}f(s\theta_{\mathrm{I}})$ and $b^\star_{\mathrm{I}-}=\min\{\rho_{\mathrm{I}-},1-b^\star_{\mathrm{I}+}\}$ for $\mathrm{I}^-=\{\mathrm{R},\mathrm{D}\}\setminus\mathrm{I}^+$. As we assume we have EIE, by its definition in Table 1, we must have $b^\star_{\mathrm{I}+}=\rho_{\mathrm{I}+}$, as otherwise we would have $b^\star_{\mathrm{I}-}=0<b_{\mathrm{I}+}$, which would violate EIE. With $\rho_{\mathrm{R}}+\rho_{\mathrm{D}}>1$ in this case, we obtain $b^\star_{\mathrm{I}-}=1-\rho_{\mathrm{I}+}<\rho_{\mathrm{I}-}$. At the same time, fairness in effort requires $b^\star_{\mathrm{I}+}/p_{\mathrm{I}+}=b^\star_{\mathrm{I}-}/p_{\mathrm{I}-}$, so (paying attention to the distinction between p and ρ) by substituting $b^\star_{\mathrm{I}+}=\rho_{\mathrm{I}+}$ and $b^\star_{\mathrm{I}-}=1-\rho_{\mathrm{I}+}$; and then substituting $p_{\mathrm{I}-}=1-p_{\mathrm{I}+}$, we find

$$\frac{b^\star_{\mathrm{I}+}}{p_{\mathrm{I}+}}=\frac{b^\star_{\mathrm{I}-}}{p_{\mathrm{I}-}}\Rightarrow\frac{\rho_{\mathrm{I}+}}{p_{\mathrm{I}+}}=\frac{1-\rho_{\mathrm{I}+}}{p_{\mathrm{I}-}}\Rightarrow\frac{\rho_{\mathrm{I}+}}{p_{\mathrm{I}+}}=\frac{1-\rho_{\mathrm{I}+}}{1-p_{\mathrm{I}+}}\Rightarrow\rho_{\mathrm{I}+}=p_{\mathrm{I}+}. \tag{26}$$

It follows that $b^\star_{\mathrm{I}-}=1-\rho_{\mathrm{I}+}=1-p_{\mathrm{I}+}=p_{\mathrm{I}-}$, so $\boldsymbol{b}^\star_{\mathrm{I}}=p_{\mathrm{I}}$ for both dockets $\mathrm{I}\in\{\mathrm{R},\mathrm{D}\}$.

Case 2: (Indiff. Condition) *holds*. Given that $\rho_{\mathrm{R}}+\rho_{\mathrm{D}}>1$, for any optimal effort allocation $\boldsymbol{b}^\star$, the accuracy $\textsc{Acc}(\boldsymbol{P},\tau)$ is equal to

$$1-\bar{v}+n\sum_{\mathrm{I}\in\{\mathrm{R},\mathrm{D}\}}b^\star_{\mathrm{I}}\bar{v}_{\mathrm{I}}f(s\theta_{\mathrm{I}})/(s\lambda)=\bar{v}_{\mathrm{R}}f(s\theta_{\mathrm{R}})/(s\lambda)\sum_{\mathrm{I}\in\{\mathrm{R},\mathrm{D}\}}b^\star_{\mathrm{I}}=1-\bar{v}+n\sum_{\mathrm{I}\in\{\mathrm{R},\mathrm{D}\}}p_{\mathrm{I}}\bar{v}_{\mathrm{I}}f(s\theta_{\mathrm{I}})/(s\lambda), \tag{27}$$

where the second equality is by (Indiff. Condition) and the last uses $p_{\mathrm{R}}+p_{\mathrm{D}}=b^\star_{\mathrm{R}}+b^\star_{\mathrm{D}}=1$. $\square$

E.4. No improvement for the proportional effort allocation if the preferred docket is faster (Lemma 6)

Proof of Lemma 6. We fix $(\boldsymbol{P}, \tau)$ and omit the dependence on it when it is clear. We first define the utility under an effort allocation that is proportional with respect to the arrival rates:

$$u_{\text{PRO}} = n \sum_{\text{I} \in \{\text{R}, \text{D}\}} p_{\text{I}} \bar{v}_{\text{I}} f(s\theta_{\text{I}})/s. \tag{28}$$

With this definition, proving the desired result is equivalent to showing $u_{\text{PRO}} \leq u^{\text{SD}}(q(\boldsymbol{P}, \tau))$.

Since the lawyers are overloaded, Lemma 10 implies $\rho^{\text{SD}}(q(\boldsymbol{P}, \tau)) \geq \rho_{\text{R}} + \rho_{\text{D}} > 1$ where the last inequality is from the lemma condition. Thus, by Proposition 4 for $\rho^{\text{SD}}(q(\boldsymbol{P}, \tau)) > 1$, we can write the respective utility of the single-docket system with the same queue length as

$$u^{\text{SD}}(q(\boldsymbol{P}, \tau)) = \bar{v} n f(s\lambda / q(\boldsymbol{P}, \tau))/s = (n/s)(p_{\text{R}} \bar{v}_{\text{R}} + p_{\text{D}} \bar{v}_{\text{D}}) h\left(\frac{p_{\text{R}}}{s\theta_{\text{R}}} + \frac{p_{\text{D}}}{s\theta_{\text{D}}}\right), \tag{29}$$

where we substitute (5) for $q(\boldsymbol{P}, \tau)$ and $h(x) = f(1/x)$. Subtracting (28) from this equation gives

$$u^{\text{SD}}(q(\boldsymbol{P}, \tau)) - u_{\text{PRO}} = (n/s) \sum_{\text{I} \in \{\text{R}, \text{D}\}} p_{\text{I}} \bar{v}_{\text{I}} \left(h\left(\frac{p_{\text{R}}}{s\theta_{\text{R}}} + \frac{p_{\text{D}}}{s\theta_{\text{D}}}\right) - h\left(\frac{1}{s\theta_{\text{I}}}\right)\right). \tag{30}$$

By the lemma condition, there is a docket I^+ such that $\bar{v}_{\text{I}^+} f(s\theta_{\text{I}^+}) \geq \bar{v}_{\text{I}^-} f(s\theta_{\text{I}^-})$ and $\theta_{\text{I}^+} \geq \theta_{\text{I}^-}$ where I^- is the other docket. If $\theta_{\text{I}^+} = \theta_{\text{I}^-}$, (30) directly gives $u^{\text{SD}}(q(\boldsymbol{P}, \tau) = u_{\text{PRO}}$, which finishes the proof. We thus focus on $\theta_{\text{I}^+} > \theta_{\text{I}^-}$ for the remainder of the proof. Since $f(\cdot)$ is a strictly decreasing function (Fact 2), this implies $\bar{v}_{\text{I}^+} > \bar{v}_{\text{I}^-}$. With the notation $w = {p_{\text{R}}}/{s\theta_{\text{R}}} + {p_{\text{D}}}/{s\theta_{\text{D}}}$ it follows that ${1}/{s\theta_{\text{I}^+}} < w < {1}/{s\theta_{\text{I}^-}}$. Since $h(\cdot)$ is differentiable over $(0, +\infty)$, we can apply the mean-value theorem to show that there exist $\eta_{\text{I}^+} \in ({1}/{s\theta_{\text{I}^+}}, w)$ and $\eta_{\text{I}^-} \in (w, {1}/{s\theta_{\text{I}^-}})$, such that $h(w) - h({1}/{s\theta_{\text{I}}}) = h'(\eta_{\text{I}})(w - {1}/{s\theta_{\text{I}}})$ for $\text{I} \in \{\text{I}^+, \text{I}^-\}$. Substituting this result in (30) gives, with $p_{\text{R}}(1 - p_{\text{R}}) = p_{\text{D}}(1 - p_{\text{D}})$:

$$\begin{aligned} u^{\text{SD}}(q(\boldsymbol{P}, \tau)) - u_{\text{PRO}} &= (n/s)\left(p_{\text{R}} \bar{v}_{\text{R}} h'(\eta_{\text{R}})(1 - p_{\text{R}})\left(\frac{1}{s\theta_{\text{D}}} - \frac{1}{s\theta_{\text{R}}}\right) + p_{\text{D}} \bar{v}_{\text{D}} h'(\eta_{\text{D}})(1 - p_{\text{D}})\left(\frac{1}{s\theta_{\text{R}}} - \frac{1}{s\theta_{\text{D}}}\right)\right) \\ &= (n/s)\frac{p_{\text{R}}(1 - p_{\text{R}})}{s}\left(\frac{1}{\theta_{\text{I}^-}} - \frac{1}{\theta_{\text{I}^+}}\right)\left(h'(\eta_{\text{I}^+})\bar{v}_{\text{I}^+} - h'(\eta_{\text{I}^-})\bar{v}_{\text{I}^-}\right). \end{aligned} \tag{31}$$

The terms (n/s), $\frac{p_{\text{R}}(1-p_{\text{R}})}{s}$, and $\left(\frac{1}{\theta_{\text{I}^-}} - \frac{1}{\theta_{\text{I}^+}}\right)$ are non-negative. Thus, it remains to prove that $(h'(\eta_{\text{I}^+})\bar{v}_{\text{I}^+} - h'(\eta_{\text{I}^-})\bar{v}_{\text{I}^-})$ is non-negative. We now use that (Fact 1) there exists $x_0 \in (0, +\infty)$ such that $h'(x)$ strictly increases in $(0, x_0)$ and strictly decreases in $(x_0, +\infty)$. We consider two cases for the value of η_{I^+} relative to x_0:

- $\eta_{\text{I}^+} \geq x_0$: since h' strictly decreases over $(x_0, +\infty)$ and $\eta_{\text{I}^+} < w < \eta_{\text{I}^-}$ we have $h'(\eta_{\text{I}^+}) > h'(\eta_{\text{I}^-})$ in this case; combined with $\bar{v}_{\text{I}^+} > \bar{v}_{\text{I}^-}$, this implies $h'(\eta_{\text{I}^+})\bar{v}_{\text{I}^+} - h'(\eta_{\text{I}^-})\bar{v}_{\text{I}^-} > 0$.
- $\eta_{\text{I}^+} < x_0$: We argue by contradiction. Suppose $h'(\eta_{\text{I}^+})\bar{v}_{\text{I}^+} - h'(\eta_{\text{I}^-})\bar{v}_{\text{I}^-} \leq 0$, which implies

$$h'(\eta_{\text{I}^-})\bar{v}_{\text{I}^-} \geq h'(\eta_{\text{I}^+})\bar{v}_{\text{I}^+} > h'({1}/{s\theta_{\text{I}^+}})\bar{v}_{\text{I}^+}. \tag{32}$$

The last inequality above follows from $x_0 > \eta_{\text{I}+} > {}^1/_{s\theta_{\text{I}+}}$ and $h'(x)$ being strictly increasing in $(0, x_0)$. Next, by definition of I^+,

$$h({}^1/_{s\theta_{\text{I}+}})\bar{v}_{\text{I}+} \geq h({}^1/_{s\theta_{\text{I}-}})\bar{v}_{\text{I}-} > h(\eta_{\text{I}-})\bar{v}_{\text{I}-}, \tag{33}$$

where the last inequality holds since $h(x) = f(1/x)$ is strictly increasing (Fact 2) and $1/s\theta_{\text{I}-} > \eta_{\text{I}-}$. (33) implies $\bar{v}_{\text{I}+} > h(\eta_{\text{I}-})\bar{v}_{\text{I}-}/h({}^1/_{s\theta_{\text{I}+}})$. Combining this inequality with (32):

$$h'(\eta_{\text{I}-})\bar{v}_{\text{I}-} > h'({}^1/_{s\theta_{\text{I}+}})h(\eta_{\text{I}-})\bar{v}_{\text{I}-}/h({}^1/_{s\theta_{\text{I}+}})$$

implying, as $h(x) > 0$ and $h(x)$ is strictly increasing by Fact 2 and thus $h'(x) > 0\,\forall x > 0$,

$$h({}^1/_{s\theta_{\text{I}+}})/h'({}^1/_{s\theta_{\text{I}+}}) > h(\eta_{\text{I}-})/h'(\eta_{\text{I}-}).$$

This inequality contradicts ${}^1/_{s\theta_{\text{I}+}} < w < \eta_{\text{I}-}$ since Fact 1 states that $h(x)/h'(x)$ strictly increases in $(0, +\infty)$. Therefore, we must have $h'(\eta_{\text{I}+})\bar{v}_{\text{I}+} > h'(\eta_{\text{I}-})\bar{v}_{\text{I}-}$ when $\eta_{\text{I}+} < x_0$.
It follows that $h'(\eta_{\text{I}+})\bar{v}_{\text{I}+} > h'(\eta_{\text{I}-})\bar{v}_{\text{I}-}$, so (31) is positive and $u^{\text{SD}}(q) > u_{\text{PRO}}$ when $\theta_{\text{I}+} > \theta_{\text{I}-}$. □

E.5. Indifference condition implies no improvement (Lemma 7)

We prove a stronger result without requiring EIE, which immediately implies Lemma 7.

LEMMA 11. *If* $\rho_{\text{R}} + \rho_{\text{D}} > 1$ *and* (Indiff. Condition)*, then* $\textsc{Acc}(\boldsymbol{P}, \tau) \leq \textsc{Acc}^{\text{SD}}(q(\boldsymbol{P}, \tau))$.

Proof of Lemma 11. Label I^+, I^- such that $\theta_{\text{I}+} \geq \theta_{\text{I}-}$. Since condition (i) of Lemma 6 holds trivially given (Indiff. Condition) and $\theta_{\text{I}+} \geq \theta_{\text{I}-}$, Lemma 6 applies. Combining (27) (which holds since the lawyers are overloaded and the lemma assumes (Indiff. Condition)) and Lemma 6 gives

$$\textsc{Acc}(\boldsymbol{P}, \tau) = 1 - \bar{v} + n \sum_{\text{I} \in \{\text{R}, \text{D}\}} p_{\text{I}} \bar{v}_{\text{I}} f(s\theta_{\text{I}})/(s\lambda) \leq \textsc{Acc}^{\text{SD}}(q(\boldsymbol{P}, \tau)), \quad \text{which proves the desired result.} \quad \square$$

E.6. Proof of Lemma 8

Proof. Recall that the load of a docket I is $\rho_{\text{I}} = \lambda p_{\text{I}}/(n\mu_{\text{I}})$ and thus $\rho_{\text{I}}/p_{\text{I}} = \lambda/(n\mu_{\text{I}})$. Let I^+ be the lawyers' preferred docket, i.e., the one that fulfills Condition (i) of Lemma 6. EIE implies that the optimal effort allocation must be $b^\star_{\text{I}+} = \rho_{\text{I}+}, b^\star_{\text{I}-} = 1 - \rho_{\text{I}-}$. As a result,

$$\lambda/(n\mu_{\text{I}+}) = \rho_{\text{I}+}/p_{\text{I}+} \overset{\text{EIE}}{=} (1 - \rho_{\text{I}+})/p_{\text{I}-} < \rho_{\text{I}-}/p_{\text{I}-} = \lambda/(n\mu_{\text{I}-}) \Longrightarrow \mu_{\text{I}+} > \mu_{\text{I}-},$$

i.e., the lawyers' service rate for the preferred docket is faster than that for the other docket. By (6), it follows that I^+ must be the faster docket, i.e., $\theta_{\text{I}+} > \theta_{\text{I}-}$, which verifies Condition (ii). □

E.7. Proof of Theorem 2

We first prove the EIO part of Theorem 2, i.e., $\textsc{Acc}^{\mathrm{EIO}}(q) \leq \textsc{Acc}^{\mathrm{SD}}(q)$ for any $q>0$, and then the DNH-E part, i.e., $\textsc{Acc}^{\text{DNH-E}}(q) \leq \textsc{Acc}^{\mathrm{SD}}(q)$ for any $q>0$, of the theorem.

Proof of EIO *result in Theorem 2.* Throughout the proof, we fix a decision $(\boldsymbol{P},\tau)$ that satisfies EIO and omit dependence on it when clear from the context. The result is equivalent to having $\textsc{Acc}(\boldsymbol{P},\tau) \leq \textsc{Acc}^{\mathrm{SD}}(q(\boldsymbol{P},\tau))$ for any such $(\boldsymbol{P},\tau)$. As in the EIE result, we consider three cases.

Case 1: $\rho_{\mathrm{R}}+\rho_{\mathrm{D}} \leq 1$. Proposition 3 shows that there is a unique optimal effort allocation $\boldsymbol{b}^\star$ with $b^\star_{\mathrm{I}} = \rho_{\mathrm{I}}$ for any I. EIO requires that $C_{\mathrm{R}}^{\boldsymbol{b}^\star}/p_{\mathrm{R}} = C_{\mathrm{D}}^{\boldsymbol{b}^\star}/p_{\mathrm{D}}$. Thus, by the characterization of C in (10),

$$\frac{n\rho_{\mathrm{R}} f(s\theta_{\mathrm{R}})}{p_{\mathrm{R}} s} = \frac{n\rho_{\mathrm{D}} f(s\theta_{\mathrm{D}})}{p_{\mathrm{D}} s}. \tag{34}$$

Since $\rho_{\mathrm{I}} = \frac{\lambda p_{\mathrm{I}}}{n\mu_{\mathrm{I}}} = \frac{\lambda p_{\mathrm{I}}(1-\exp(-s\theta_{\mathrm{I}}))}{\theta_{\mathrm{I}}}$ by (6), and $f(x) = \frac{x\exp(-x)}{1-\exp(-x)}$, (34) implies $\exp(-s\theta_{\mathrm{R}}) = \exp(-s\theta_{\mathrm{D}})$, and thus also $\theta_{\mathrm{R}} = \theta_{\mathrm{D}}$. Applying Lemma 4 then shows $\textsc{Acc}(\boldsymbol{P},\tau) = \textsc{Acc}^{\mathrm{SD}}(q(\boldsymbol{P},\tau))$.

Case 2: $\rho_{\mathrm{R}}+\rho_{\mathrm{D}} > 1$ *and* (Indiff. Condition) *does not hold.* Then there is a docket I^+ such that $\bar{v}_{\mathrm{I}^+} f(s\theta_{\mathrm{I}^+}) > \bar{v}_{\mathrm{I}^-} f(s\theta_{\mathrm{I}^-})$ with I^- being the other docket. Proposition 3 shows that there is a unique optimal effort allocation $\boldsymbol{b}^\star$ such that $b^\star_{\mathrm{I}^+} = \min\{\rho_{\mathrm{I}^+},1\}, b^\star_{\mathrm{I}^-} = \min\{\rho_{\mathrm{I}^-}, 1-b^\star_{\mathrm{I}^+}\}$. However, by EIO, lawyers cannot allocate all their effort to docket I^+, and thus $b^\star_{\mathrm{I}^+} = \rho_{\mathrm{I}^+}$. In addition, the case condition that $\rho_{\mathrm{R}}+\rho_{\mathrm{D}} > 1$ implies $b^\star_{\mathrm{I}^-} = 1 - b^\star_{\mathrm{I}^+} < \rho_{\mathrm{I}^-}$. Given this effort allocation, EIO implies

$$\frac{n\rho_{\mathrm{I}^+} f(s\theta_{\mathrm{I}^+})}{p_{\mathrm{I}^+} s} = \frac{n b^\star_{\mathrm{I}^-} f(s\theta_{\mathrm{I}^-})}{p_{\mathrm{I}^-} s} < \frac{n\rho_{\mathrm{I}^-} f(s\theta_{\mathrm{I}^-})}{p_{\mathrm{I}^-} s}. \tag{35}$$

Following the same discussion as right below (34), the left hand side of the inequality evaluates to $\exp(-s\theta_{\mathrm{I}^+})$ and the right hand side evaluates to $\exp(-s\theta_{\mathrm{I}^-})$. As a result, EIO implies $\theta_{\mathrm{I}^+} > \theta_{\mathrm{I}^-}$. Using that $f(\cdot)$ is a decreasing function (Fact 2) this also implies $\bar{v}_{\mathrm{I}^+} > \bar{v}_{\mathrm{I}^-}$ as we defined I^+ such that $\bar{v}_{\mathrm{I}^+} f(s\theta_{\mathrm{I}^+}) > \bar{v}_{\mathrm{I}^-} f(s\theta_{\mathrm{I}^-})$.

The equality in (35) and the fact that $b^\star_{\mathrm{I}^-} = 1 - b^\star_{\mathrm{I}^+} = 1-\rho_{\mathrm{I}^+}$ and $p_{\mathrm{I}^-} = 1 - p_{\mathrm{I}^+}$ give

$$\frac{\rho_{\mathrm{I}^+} f(s\theta_{\mathrm{I}^+})}{p_{\mathrm{I}^+}} = \frac{(1-\rho_{\mathrm{I}^+}) f(s\theta_{\mathrm{I}^-})}{1-p_{\mathrm{I}^+}}, \text{ which implies } \rho_{\mathrm{I}^+} = \frac{p_{\mathrm{I}^+} f(s\theta_{\mathrm{I}^-})}{p_{\mathrm{I}^+} f(s\theta_{\mathrm{I}^-}) + p_{\mathrm{I}^-} f(s\theta_{\mathrm{I}^+})}. \tag{36}$$

Using the characterization of accuracy $(u(\boldsymbol{P},\tau) + (1-\bar{v})\lambda)/\lambda = 1 - \bar{v} + u(\boldsymbol{P},\tau)/\lambda$ from the paragraph before Equation (2), combined with (11), the accuracy under $(\boldsymbol{P},\tau)$ is

$$\begin{aligned}\textsc{Acc}(\boldsymbol{P},\tau) &= 1-\bar{v} + (n/\lambda s)(\bar{v}_{\mathrm{I}^+}\rho_{\mathrm{I}^+} f(s\theta_{\mathrm{I}^+}) + \bar{v}_{\mathrm{I}^-}(1-\rho_{\mathrm{I}^+}) f(s\theta_{\mathrm{I}^-})) \\ &= 1-\bar{v} + (n/\lambda s)\cdot \frac{f(s\theta_{\mathrm{R}}) f(s\theta_{\mathrm{D}})(\bar{v}_{\mathrm{R}} p_{\mathrm{R}} + \bar{v}_{\mathrm{D}} p_{\mathrm{D}})}{p_{\mathrm{R}} f(s\theta_{\mathrm{D}}) + p_{\mathrm{D}} f(s\theta_{\mathrm{R}})},\end{aligned} \tag{37}$$

where the last equality is by (36). As $\rho_{\mathrm{R}}+\rho_{\mathrm{D}} > 1$, Lemma 10 implies $\rho^{\mathrm{SD}}(q(\boldsymbol{P},\tau)) > 1$. Applying the above characterization of accuracy, and following the same derivation of (29), gives

$$\textsc{Acc}^{\mathrm{SD}}(q(\boldsymbol{P},\tau)) = 1-\bar{v} + (n/\lambda s)(p_{\mathrm{R}}\bar{v}_{\mathrm{R}} + p_{\mathrm{D}}\bar{v}_{\mathrm{D}}) h\left(\frac{p_{\mathrm{R}}}{s\theta_{\mathrm{R}}} + \frac{p_{\mathrm{D}}}{s\theta_{\mathrm{D}}}\right).$$

Recalling that that $h(x) = f(1/x)$, we can compare this equation with (37) to compute

$$\text{ACC}^{\text{SD}}(q(\boldsymbol{P},\tau)) - \text{ACC}(\boldsymbol{P},\tau) = (n/\lambda s)(p_{\text{R}}\bar{v}_{\text{R}} + p_{\text{D}}\bar{v}_{\text{D}})\left(h\left(\frac{p_{\text{R}}}{s\theta_{\text{R}}} + \frac{p_{\text{D}}}{s\theta_{\text{D}}}\right) - \frac{h(1/s\theta_{\text{R}})h(1/s\theta_{\text{D}})}{p_{\text{R}}h(1/s\theta_{\text{D}}) + p_{\text{D}}h(1/s\theta_{\text{R}})}\right),$$

which is positive if and only if the last term is. Denoting $w = \frac{p_{\text{R}}}{s\theta_{\text{R}}} + \frac{p_{\text{D}}}{s\theta_{\text{D}}}$, this is equivalent to

$$\begin{aligned} & p_{\text{R}} h\left(\frac{1}{s\theta_{\text{D}}}\right) h(w) + p_{\text{D}} h\left(\frac{1}{s\theta_{\text{R}}}\right) h(w) > h\left(\frac{1}{s\theta_{\text{R}}}\right) h\left(\frac{1}{s\theta_{\text{D}}}\right) \\ \Leftrightarrow\ & p_{\text{R}} h\left(\frac{1}{s\theta_{\text{D}}}\right)\left(h(w) - h\left(\frac{1}{s\theta_{\text{R}}}\right)\right) + p_{\text{D}} h\left(\frac{1}{s\theta_{\text{R}}}\right)\left(h(w) - h\left(\frac{1}{s\theta_{\text{D}}}\right)\right) > 0. \end{aligned} \tag{38}$$

Since $\theta_{\text{I}^+} > \theta_{\text{I}^-}$, we have $1/(s\theta_{\text{I}^+}) < w < 1/(s\theta_{\text{I}^-})$. In addition, the mean value theorem implies that there exist $\eta_{\text{I}^+} \in (1/(s\theta_{\text{I}^+}), w), \eta_{\text{I}^-} \in (w, 1/(s\theta_{\text{I}^-}))$ such that $h(w) - h(1/(s\theta_{\text{I}})) = h'(\eta_{\text{I}})(w - 1/(s\theta_{\text{I}}))$ for $\text{I} \in \{\text{I}^+, \text{I}^-\}$. Substituting this expansion into (38) we thus find (similar to the derivation of (31)) that $\text{ACC}^{\text{SD}}(q(\boldsymbol{P},\tau)) - \text{ACC}(\boldsymbol{P},\tau) > 0$ is equivalent to

$$\frac{p_{\text{R}}(1-p_{\text{R}})}{s}\left(\frac{1}{\theta_{\text{I}^-}} - \frac{1}{\theta_{\text{I}^+}}\right)\left(h\left(\frac{1}{s\theta_{\text{I}^-}}\right)h'(\eta_{\text{I}^+}) - h\left(\frac{1}{s\theta_{\text{I}^+}}\right)h'(\eta_{\text{I}^-})\right) > 0. \tag{39}$$

The remainder of the proof shows $h\left(\frac{1}{s\theta_{\text{I}^-}}\right)h'(\eta_{\text{I}^+}) > h\left(\frac{1}{s\theta_{\text{I}^+}}\right)h'(\eta_{\text{I}^-})$. Let x_0 be as given in Fact 1 such that $h'(x)$ strictly increases in $(0, x_0)$ and strictly decreases in $(x_0, +\infty)$. We consider two cases:

- $\eta_{\text{I}^+} \geq x_0$. Then $h'(\eta_{\text{I}^+}) > h'(\eta_{\text{I}^-})$ since $h'(x)$ strictly decreases in $[\eta_{\text{I}^+}, +\infty)$ and $\eta_{\text{I}^+} < \eta_{\text{I}^-}$. Furthermore, $h\left(\frac{1}{s\theta_{\text{I}^-}}\right) > h\left(\frac{1}{s\theta_{\text{I}^+}}\right)$ because $h(1/x) = f(x)$, $\theta_{\text{I}^-} < \theta_{\text{I}^+}$ and $f(x)$ strictly decreases by Fact 2. As a result, $h\left(\frac{1}{s\theta_{\text{I}^-}}\right)h'(\eta_{\text{I}^+}) > h\left(\frac{1}{s\theta_{\text{I}^+}}\right)h'(\eta_{\text{I}^-})$.
- $\eta_{\text{I}^+} < x_0$. We prove the inequality by contradiction. Suppose we have $h\left(\frac{1}{s\theta_{\text{I}^-}}\right)h'(\eta_{\text{I}^+}) \leq h\left(\frac{1}{s\theta_{\text{I}^+}}\right)h'(\eta_{\text{I}^-})$. Note that $h'(\eta_{\text{I}^+}) > h'\left(\frac{1}{s\theta_{\text{I}^+}}\right)$ because $\eta_{\text{I}^+} > \frac{1}{s\theta_{\text{I}^+}}$ and $h'(x)$ strictly increases over $(0, x_0)$. In addition, $h(\eta_{\text{I}^-}) < h(1/s\theta_{\text{I}^-})$ because $h(x)$ strictly increases and $\eta_{\text{I}^-} < 1/s\theta_{\text{I}^-}$. These results imply, under the inequality we assume for sake of contradiction, that

$$h(\eta_{\text{I}^-})h'\left(\frac{1}{s\theta_{\text{I}^+}}\right) < h\left(\frac{1}{s\theta_{\text{I}^-}}\right)h'(\eta_{\text{I}^+}) \leq h\left(\frac{1}{s\theta_{\text{I}^+}}\right)h'(\eta_{\text{I}^-}), \text{ i.e., } \frac{h(\eta_{\text{I}^-})}{h'(\eta_{\text{I}^-})} < \frac{h\left(\frac{1}{s\theta_{\text{I}^+}}\right)}{h'\left(\frac{1}{s\theta_{\text{I}^+}}\right)}.$$

Since $h(x)/h'(x)$ strictly increases (Fact 1) and $\frac{1}{s\theta_{\text{I}^+}} < w < \eta_{\text{I}^-}$, this contradicts with $\frac{h(\eta_{\text{I}^-})}{h'(\eta_{\text{I}^-})} > \frac{h\left(\frac{1}{s\theta_{\text{I}^+}}\right)}{h'\left(\frac{1}{s\theta_{\text{I}^+}}\right)}$.

Combining the above two discussions shows that we always have $h\left(\frac{1}{s\theta_{\text{I}^-}}\right)h'(\eta_{\text{I}^+}) > h\left(\frac{1}{s\theta_{\text{I}^+}}\right)h'(\eta_{\text{I}^-})$, and thus $\text{ACC}^{\text{SD}}(q(\boldsymbol{P},\tau)) - \text{ACC}(\boldsymbol{P},\tau) > 0$ by (39).

Case 3: $\rho_{\text{R}} + \rho_{\text{D}} > 1$ *and* (Indiff. Condition) *does hold.* This case is addressed by Lemma 11, which shows that we must have $\text{ACC}^{\text{SD}}(q(\boldsymbol{P},\tau)) - \text{ACC}(\boldsymbol{P},\tau) \geq 0$. $\square$

Proof of DNH-E *result in Theorem 2.* Fix $(\boldsymbol{P},\tau) \in \Omega_{\text{DNH-E}}$ and let $\boldsymbol{b}^\star$ be any optimal solution to (11). To ease notations, we will omit the dependence on $\boldsymbol{P},\tau$ when it is clear. By the definition of DNH-E, the average effort in any docket is lower bounded by the effort of a single docket, i.e., $b_{\text{I}}/p_{\text{I}} \geq b^{\text{SD}}(q(\boldsymbol{P},\tau))$ for any I and $b^{\text{SD}}(q(\boldsymbol{P},\tau)) = \min(1, \rho^{\text{SD}}(q(\boldsymbol{P},\tau)))$ from (19). Our goal is to show $\textsc{Acc}(\boldsymbol{P},\tau) \leq \textsc{Acc}^{\text{SD}}(q(\boldsymbol{P},\tau))$. Consider two cases:

- $b^{\text{SD}}(q(\boldsymbol{P},\tau)) = 1$: then DNH-E implies $b_{\text{I}}/p_{\text{I}} \geq 1$ for $\text{I} \in \{\text{R},\text{D}\}$. Given that $p_{\text{R}} + p_{\text{D}} = 1$ and $b_{\text{R}} + b_{\text{D}} \leq 1$ by (9), having $b_{\text{I}}/p_{\text{I}} \geq 1$ for $\text{I} \in \{\text{R},\text{D}\}$ requires $b_{\text{R}} = p_{\text{R}}$ and $b_{\text{D}} = p_{\text{D}}$. Thus, $b_{\text{R}}/p_{\text{R}} = b_{\text{D}}/p_{\text{D}}$, i.e., the decision $(\boldsymbol{P},\tau)$ satisfies EIE. Since we have already shown that $\textsc{Acc}^{\Omega_{\text{EIE}}}(q) \leq \textsc{Acc}^{\text{SD}}(q)$ for any $q > 0$, we have $\textsc{Acc}(\boldsymbol{P},\tau) \leq \textsc{Acc}^{\text{SD}}(q(\boldsymbol{P},\tau))$.
- $b^{\text{SD}}(q(\boldsymbol{P},\tau)) = \rho^{\text{SD}}(q(\boldsymbol{P},\tau)) \leq 1$: this implies $b_{\text{I}}/p_{\text{I}} \geq \rho^{\text{SD}}(q(\boldsymbol{P},\tau))$. Recall that we define $g(x) = x(1-e^{-1/x})$. Since Eq. (25) shows that $\rho^{\text{SD}}(q(\boldsymbol{P},\tau)) = (s\lambda/n)g(p_{\text{R}}/s\theta_{\text{R}} + p_{\text{D}}/\theta_{\text{D}})$, the effort for a docket $\text{I} \in \{\text{R},\text{D}\}$ satisfies

$$b_{\text{I}} \geq \frac{s\lambda p_{\text{I}}}{n} g\left(\frac{p_{\text{R}}}{s\theta_{\text{R}}} + \frac{p_{\text{D}}}{s\theta_{\text{D}}}\right).$$

Let I^+ be the faster docket, i.e., $\theta_{\text{I}^+} = \max(\theta_{\text{R}}, \theta_{\text{D}})$. Since $g(x)$ is strictly increasing (Fact 3, Appendix H), we obtain $g(1/(s\theta_{\text{I}^+})) \leq g\left(\frac{p_{\text{R}}}{s\theta_{\text{R}}} + \frac{p_{\text{D}}}{s\theta_{\text{D}}}\right)$ which is an equality if and only if $\theta_{\text{R}} = \theta_{\text{D}}$.

$$\text{As a result,} \quad b_{\text{I}^+} \geq \frac{s\lambda p_{\text{I}}}{n} g(1/(s\theta_{\text{I}^+})), \text{ where the inequality is tight if and only if } \theta_{\text{R}} = \theta_{\text{D}}.$$

However, the constraint in (9) requires $b_{\text{I}^+} \leq \rho_{\text{I}^+}$ and $\rho_{\text{I}^+} = \frac{s\lambda p_{\text{I}}}{n} g(1/(s\theta_{\text{I}^+}))$ by (23). Therefore,

$$\frac{s\lambda p_{\text{I}}}{n} g(1/(s\theta_{\text{I}^+})) = \rho_{\text{I}^+} \geq b_{\text{I}^+} \geq \frac{s\lambda p_{\text{I}}}{n} g(1/(s\theta_{\text{I}^+})) \Rightarrow \theta_{\text{R}} = \theta_{\text{D}}, \quad \text{i.e.,}$$

both dockets have the same speed. Further combining the case assumption $\rho^{\text{SD}}(q(\boldsymbol{P},\tau)) \leq 1$ with Lemma 10 gives $\rho_{\text{R}} + \rho_{\text{D}} \leq \rho^{\text{SD}}(q(\boldsymbol{P},\tau)) \leq 1$. As a result, the two-docket system is under-loaded with two dockets of the same speed. Lemma 4 applies and shows $\textsc{Acc}(\boldsymbol{P},\tau) = \textsc{Acc}^{\text{SD}}(q(\boldsymbol{P},\tau))$.

Combining the cases we conclude the proof that $\textsc{Acc}(\boldsymbol{P},\tau) \leq \textsc{Acc}^{\text{SD}}(q(\boldsymbol{P},\tau))$ for $(\boldsymbol{P},\tau) \in \Omega_{\text{DNH-E}}$.

E.8. Ensuring Group Fairness Needs not Harm the Efficiency

As an alternative to measures of fairness between dockets, the PM may also be interested in group fairness between protected groups of asylees. In this section, we discuss an extension that captures such a notion and show that a two-docket system can improve upon a single-docket one while maintaining our notion of group fairness. Formally, suppose there is a set $\mathcal{G}$ of asylee groups, and a type-k asylee is in group $g(k)$. Taking EIE as an example, we extend between-docket fairness to group fairness, i.e., group fairness in effort (GFIE), by requiring equal average effort across groups

$$\Omega_{\text{GFIE}} = \left\{(\boldsymbol{P},\tau) \in \Omega_{\text{EFF}} : \exists \boldsymbol{b}^\star \text{ optimal to (11), such that } b_g^\star(\boldsymbol{P})/p_g \text{ are the same across any } g \in \mathcal{G}\right\}$$

where the aggregated group-g effort $b_g^\star(\boldsymbol{P})$ is given by $\sum_{k:g(k)=g} \sum_{\text{I}\in\text{R,D}} p_k P_{k,\text{I}} b_{\text{I}}^\star/p_{\text{I}}(\boldsymbol{P})$ and the fraction of group-g asylees p_g is $\sum_{k:\ g(k)=g} p_k$. Whereas fairness between dockets removes the efficiency benefit of the two-docket system by Theorem 2, the two-docket system can Pareto improve a single docket while maintaining group fairness. We define the probability of a group-g asylee to join docket I as $P_{g,\mathrm{I}}(\boldsymbol{P}) = \sum_{k:g(k)=g} p_k P_{k,\mathrm{I}}/p_g$ and the set of *equal routing* decisions

$$\Omega_{\mathrm{EQR}} = \{(\boldsymbol{P},\tau) \in \Omega_{\mathrm{EFF}}:\, P_{g,\mathrm{I}}(\boldsymbol{P}) = P_{g',\mathrm{I}}(\boldsymbol{P}), \forall g, g' \in \mathcal{G}, \mathrm{I} \in \{\mathrm{R},\mathrm{D}\}\},$$

which guarantee that the routing probability to either docket is the same across groups. The following result shows that under GFIE, (i) equal routing ensures group fairness; (ii) any decision ensuring group fairness must be equal routing to improve over the single docket; (iii) equal routing can improve over the single-docket. Recall $\bar{\rho}$ and $\underline{q}$ from Theorem 1.

PROPOSITION 5. *Equal routing decisions satisfy: (i)* $\Omega_{\mathrm{EQR}} \subseteq \Omega_{\mathrm{GFIE}}$*; (ii) Any* $(\boldsymbol{P},\tau) \in \Omega_{\mathrm{GFIE}} \setminus \Omega_{\mathrm{EQR}}$ *must have* $\mathrm{ACC}(\boldsymbol{P},\tau) \le \mathrm{ACC}^{\mathrm{SD}}(q(\boldsymbol{P},\tau))$*; and (iii) if* $\bar{\rho} > 4$*, then* $\mathrm{ACC}^{\Omega_{\mathrm{EQR}}}(q) > \mathrm{ACC}^{\mathrm{SD}}(q)$ *for* $q \ge \underline{q}$*.*

Proof of Proposition 5 We start with the first result. Fixing $(\boldsymbol{P},\tau) \in \Omega_{\mathrm{EQR}}$, for any $g, g' \in \mathcal{G}$,

$$\begin{aligned} b^\star_g(\boldsymbol{P})/p_g = \sum_{\mathrm{I}\in\{\mathrm{R},\mathrm{D}\}} (b^\star_{\mathrm{I}}/p_{\mathrm{I}}(\boldsymbol{P})) \left(\sum_{k:g(k)=g} p_k P_{k,\mathrm{I}}/p_g\right) &= \sum_{\mathrm{I}\in\{\mathrm{R},\mathrm{D}\}} (b^\star_{\mathrm{I}}/p_{\mathrm{I}}(\boldsymbol{P})) P_{g,\mathrm{I}}(\boldsymbol{P}) \\ &= \sum_{\mathrm{I}\in\{\mathrm{R},\mathrm{D}\}} (b^\star_{\mathrm{I}}/p_{\mathrm{I}}(\boldsymbol{P})) P_{g',\mathrm{I}}(\boldsymbol{P}) = b^\star_{g'}(\boldsymbol{P})/p_{g'} \end{aligned}$$

where the second to last equality uses $(\boldsymbol{P},\tau) \in \Omega_{\mathrm{EQR}}$. As a result, $\Omega_{\mathrm{EQR}} \subseteq \Omega_{\mathrm{GFIE}}$.

For the second result, take $(\boldsymbol{P},\tau) \in \Omega_{\mathrm{GFIE}} \setminus \Omega_{\mathrm{EQR}}$ and its corresponding optimal allocation $\boldsymbol{b}^\star$ such that $b^\star_g(\boldsymbol{P})/p_g$ is equal across groups. Since $(\boldsymbol{P},\tau)$ is not in Ω_{EQR}, there exists $g, g' \in \mathcal{G}, \mathrm{I}' \in \{\mathrm{R},\mathrm{D}\}$, such that $P_{g,\mathrm{I}'}(\boldsymbol{P}) \ne P_{g',\mathrm{I}'}(\boldsymbol{P})$. Moreover, we showed above that $b^\star_g(\boldsymbol{P})/p_g = \sum_{\mathrm{I}\in\{\mathrm{R},\mathrm{D}\}} (b^\star_{\mathrm{I}}/p_{\mathrm{I}}(\boldsymbol{P})) P_{g,\mathrm{I}}(\boldsymbol{P})$, which also holds for g'. Therefore, our choice of $\boldsymbol{b}^\star$ that fulfills $b^\star_g(\boldsymbol{P})/p_g = b^\star_{g'}(\boldsymbol{P})/p_{g'}$ guarantees

$$\sum_{\mathrm{I}\in\{\mathrm{R},\mathrm{D}\}} (b^\star_{\mathrm{I}}/p_{\mathrm{I}}(\boldsymbol{P})) P_{g,\mathrm{I}}(\boldsymbol{P}) = \sum_{\mathrm{I}\in\{\mathrm{R},\mathrm{D}\}} (b^\star_{\mathrm{I}}/p_{\mathrm{I}}(\boldsymbol{P})) P_{g',\mathrm{I}}(\boldsymbol{P}).$$

Since $P_{g,\mathrm{I}'} \ne P_{g',\mathrm{I}'}$ for some $\mathrm{I}' \in \{\mathrm{R},\mathrm{D}\}$, this implies $b^\star_{\mathrm{R}}/p_{\mathrm{R}}(\boldsymbol{P}) = b^\star_{\mathrm{D}}/p_{\mathrm{D}}(\boldsymbol{P})$, i.e., $(\boldsymbol{P},\tau) \in \Omega_{\mathrm{EIE}}$. Theorem 1 then shows $\mathrm{ACC}(\boldsymbol{P},\tau) \le \mathrm{ACC}^{\mathrm{SD}}(q(\boldsymbol{P},\tau))$, which proves the second result.

The last result follows by observing that our construction in the proof of Theorem 1 is an equal-routing policy; thus Theorem 1 indeed implies $\mathrm{ACC}^{\Omega_{\mathrm{EQR}}}(q) > \mathrm{ACC}^{\mathrm{SD}}(q)$ for $q \ge \underline{q}$ when $\bar{\rho} > 4$. $\square$

Appendix F: Supplementary Materials to Section 6: Comparison of capacity usage

Our model allows either the single-docket or the two-docket system to have a shorter combined queue when given access to the same court (service) capacity: this is because (i) pooling benefits the single docket, whereas (ii) the speedup η benefits the two-docket system. Here we discuss how this is illustrated in Figure 2: the figure displays the minimum achievable wait time of the two-docket system $q_{\min}/\lambda$, which decreases as η becomes larger, and the current wait time $\frac{1}{\varepsilon}$ which requires that all arrivals are routed to the regular docket. Across both plots the two-docket system uses the same court capacity $\kappa = \lambda + \varepsilon$ with varying routing probabilities $\boldsymbol{P}$ and delay target τ, whereas the single-docket system can arbitrarily adjust its court capacity, given by $\lambda + \lambda/q$, to obtain an average wait time q/λ. As a result, the two-docket system uses less court capacity than the single-docket system when the average wait time is between the minimum wait time $\frac{q_{\min}}{\lambda}$ and the current wait time $\frac{1}{\varepsilon}$ but more if the average wait time is higher than $\frac{1}{\varepsilon}$ (whereas a wait time lower than $q_{\min}/\lambda$ is unachievable for the two-docket system).