Religious Rituals: Evidence from Ramadan
R&R at *Science*

Sultan Mehmood[1], Daniel Chen[2], Avner Seror[3]

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[1]New Economic School, Moscow
[2]Toulouse School of Economics
[3]Aix Marseille School of Economics

Motivation

- Rituals are a feature of all known human societies (Durkheim, 1912)

- They are activities involving gestures, objects, words or actions that are performed in an ordered manner

- Through religion, culture or traditions rituals give symbolic meaning to our actions and are likely to deeply influence decisions

- Religious rituals are the most widespread (Pew, 2018; Gallup, 2022)

This Paper

- In this paper, we study the Ramadan fasting ritual

    - It is one of the most observed religious rituals in the world, followed by a billion Muslims worldwide every year (Pew, 2018)

    - How does Ramadan fasting ritual impact decision-making?

    - What are the mechanisms?

Ramadan Fasting Ritual and Decision-Making

- Theoretically, the direction of relationship between Ramadan fasting and decision-making is ambiguous:

    - Fasting can make decisions worse for instance by introducing bias or physiological depletion effects (Shayo and Zussman, 2011; Alesina and La Ferrara, 2014; Chen et al., 2016).

    - It may even motivate agents "to do the right thing" and make better decisions through psychological mechanisms of self-control and reflection (Hobson et al. 2017; Tian et. al, 2018).

    - Alternatively, fasting ritual can lead to elevation in mood (Zhang et al., 2015, Science) and increase in global cognition and working memory via increased production of the hormone, Ghrelin (de Cabo and Mattson, 2019, Nature).

The Context
Ramadan and Criminal Sentencing Decisions

- We study the ritual of Ramadan fasting because:

    - Well defined rule i.e. all adult Muslims must fast from dawn to sunset

    - No ingesting of food, liquids, engaging in sexual activities

    - The word for fasting ritual in Muslim holy texts is called *sawm* which literally means moral restraint or self-control

- Ramadan fasting is one of the most observed religious rituals (Pew, 2018)

- Setting of Pakistani and Indian Courts

    - Judges making sentencing decisions in the largest courts in the world

    - 1.5 billion people and over 11,000 judges

    - Criminal sentencing provide an ideal setting to observe quality of decision-making seen through the lens of errors (reversals) and downstream consequences (recidivism)

Identification - Ramadan and Judicial Decisions

- Three critical sources of endogeniety our setting can speak to:

  1. Does not confound different type of decisions because similar decisions are made by different individuals during the ritual period, since we compare Muslim and non-Muslim judges who receive randomly assigned cases.

  2. Does not confound the effects of the ritual season from the calendar season because the exact month for Ramadan changes across years according to the lunar calendar.

  3. Does not confound direct effect of Ramadan period since the daily length of Ramadan fasting also varies by geographic latitude: ritual intensity varies up to two hours on the same day.

Preview of Main Results - I

- Ritual of Ramadan fasting causes an *increase* in acquittal verdicts

    - In both Pakistan and India

    - Effect present at intensive margin (ritual effect: 10%) and extensive margin (Ramadan month effect: 40%).

- Heterogeneity:

    - Largest effect comes from the most violent crimes

    - Less acquittals by more experienced judges

    - No evidence that ritual intensity is accompanied by antipathy towards non-Muslim litigants (Clingingsmith, Khwaja and Kremer, 2009).

    - No effect of Ramadan on decisions by non-Muslim judges despite much larger sample

Preview of Main Results - II

- To understand these results, we develop a theoretical model that separates two key mechanisms:

  1. Ramadan fasting might induce a cognitive bias of leniency or physiological deprivation may make the judges more lenient

  2. Ramadan fasting may instead motivate or enable the judges to exert more effort to update their priors that defendant is innocent

- The combination of these two effects makes the **net welfare effect** of Ramadan fasting ritual theoretically ambiguous.

Preview of Main Results - III

- We disentangle these two effects in our empirical analysis by making two novel linkages in the data:

  1. Linkage between lower court cases and their reversals in higher courts
  2. Linkage between defendants re-offending .

- Through these two linkages, we observe evidence consistent with positive net effect

- One-hour increase in Ramadan fasting intensity **reduces** reversals in higher court by 4% over the sample mean

- Each additional hour of Ramadan results in reduced recidivism by about 1% over the sample mean.

Preview of Main Results - IV

- Evidence strongly suggests better quality judicial decisions

    - Muslim judges decisions are **on net less** are likely to be reversed

    - Have defendants less likely to re-offend

    - Results are unchanged when we model caes progression via Heckman selection

- No evidence that judge productivity impacted:

    - Length of judgements written, caseload per day, days to set hearing, case delay are unaffected

Related Literature

- **Traditions**

  - Economics: cultural evolution of socially beneficial behaviours (Nunn and Sanchez de la Sierra, AER 2019; Giuliano and Nunn, 2021, REStud)

  - Anthropology: ethnographies of "functional cultural traits" being followed despite the populations not knowing their benefits (Speck, 1935; Katz et al., 1974; Billing and Sherman, 1998)

    1. Maize processed with limestone in Latin America (alkaline)
    2. Spices as antimicrobial and storage technology in tropical climates
    3. Use of randomization for hunting

- **Judgement and Decision-Making**

  - Extrajudicial factors generally thought of as inducing 'worse' decisions.

  - Political, racial, gender bias - prima facie negative (e.g., Shayo and Zussman, QJE 2011)

  - Behavioural bias - normatively negative (e.g., Chen et al., QJE 2016)

Contributions

- The key contributions of this paper:

  1. We study impact of rituals on decision-making in a naturally occurring setting

  2. Rituals may, on net, induce judges to make more lenient decisions

     - This leniency implies better quality decision
     - Extrajudicial factors inducing 'better' decisions
     - Data frame is novel in the showing the affected decision's errors (reversals) and downstream consequences (recidivism)

Roadmap

1. Background

2. Theory

3. Data

4. Empirical Methodology

5. Results

6. Mechanisms

7. Heterogeneity

8. Robustness

9. Conclusions

Background

- Observing the ritual of *Sawm* (Ramadan fasting) is one of the Five Pillars of Islam

- What does it mean to observe the fasting ritual in Ramadan?

    - No ingesting of food, drink, sexual activities from sunrise to sunset

    - But it is supposed to be more than that

    - Period to reflection and "practising your self-control"

    - The word for fasting in Quran is **Sawm** which literally means "moral restraint" (Chapter 2, Verse 183)

    - Some research links it to physiological deprivation due to sleep deprivation (Bogdan et al., 2001; Van Ewijk 2011)

    - But, other scholarship links it to better cognition (Zhang et al., 2015)

Model - I

Conceptional Framework

Setup of the Model. — We model a two-stage judge j choice about a judicial case c ruled at time t in district d. In the first stage, the judge commits to a cognitive effort $e_{cjdt} > 0$ when case c is heard. In the second stage, judge j observes the characteristics of the case and adjudicates. To ease the notations, the indices will be dropped when unnecessary.

For the judge, the relative payoff from acquitting the defendant, ΔD_{cjdt}, consists of three components,

$$\Delta D_{cjdt} = D_{cjdt} - P_{cjdt} + R(e_{cjdt}), \qquad (1)$$

where D_{cjdt} is the unknown legal score of the defendant, which depends on the legal evidence brought by the defendant before the court. We assume that according to judge j, D_{cjdt} is drawn from a normal distribution $N(D_0, \sigma_D^2)$ with D_0 corresponding to judges' common prior on any defendant's score. Similarly, P_{cjdt} is the unknown legal score of the prosecution, also drawn from a normal distribution $N(P_0, \sigma_P^2)$ with P_0 corresponding to judges' common prior on the prosecution's score. Finally, $R(e_{cjdt})$ corresponds to the unknown additional legal facts that the judge will observe depending on his cognitive effort e_{cjdt} and that will affect the defendant's relative score. We also assume that $R(e_{cjdt})$ is drawn from a normal distribution $N(0, e_{cjdt}^2)$. Hence, when the judge exerts higher cognitive effort e_{cjdt} in the first stage, he realizes a payoff ΔD_{cjdt} in the second stage that can be farther from his prior scores issued for the defendant and the prosecution. That is, higher cognitive effort reduces the effect of initial priors on judicial decision-making.

Model - II

The judge cares about doing the right thing. Hence, in the second stage of the game, he acquits the defendant when $\Delta D_{cjdt} > 0$ and convicts otherwise. In the first stage, the judge invests effort e_{cjdt} so as to be able to distinguish as much as possible the defendant's score from the prosecution's score. Hence, the judge chooses a positive cognitive effort e_{cjdt} that maximizes the following utility function:

$$u_j = E\,|\Delta D_{cjdt}| - \gamma e_{cjdt}, \qquad (2)$$

where $\gamma > 0$ corresponds to the marginal cost of effort and $E\,|\Delta D_{cjdt}|$ represents the expected distance between the defendant's score and the prosecution's score.

Equilibrium. — Solving the optimization problem (2), we find the following result.

Model - III
Proposition and Intuition

PROPOSITION 1. The optimal cognitive effort of the judge e^* is uniquely determined. It decreases with $|\Delta D_0|$ and γ.

Judicial bias is captured in our model by parameter $|\Delta D_0| = |D_0 - P_0|$. We show that when the judge has no clear-cut prior on whether the defendant is guilty or innocent (i.e., $|\Delta D_0|$ is low), he will invest more cognitive effort e_{cjdt}. The reason is that higher cognitive effort is useful when it enables the judge to better distinguish the scores of the prosecution and the defendant. If the judge initially has a strong prior about the case (i.e., $|\Delta D_0|$ is high), he does not need to exert much cognitive effort, as he distinguishes well the evidence brought before the court. Next, we consider the effect of a higher incentive to make better decisions. In our model, this channel is represented by parameter γ. When the marginal cost of effort γ is lower, the judge invests more cognitive effort in order to better distinguish the scores of the prosecution and the defendant.[8]

- Grey Area Cases vs No Brainer Cases

Summary of Theory - I

1. Judges may be imbued with a Ramadan Spirit (RS) that makes them more lenient or physiological deprivation causes them to "play it safe"

   - The RS would shift priors of judges that defendants are innocent

2. During Ramadan, Muslim judges may wish to exert more effort to the facts of the case.

   - This may be due to increased global cognition (de Cabo and Mattson, 2019) or elevated mood (Zhang et al., 2015) while fasting via the release of hormone Ghrelin or just motivation to "Do the Right Thing"

   - As a result, their rulings might become more independent from their priors as Ramadan fasting gets more intense.

Summary of Theory - II
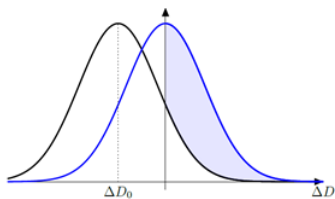
a) Effect of the RS effect
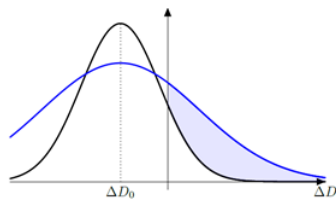
b) Effect of the DRT effect

The Data

- Pakistan and Indian e-Courts Case portals

- Judicial administrative data

- US Naval Observatory

- Islamic Philosophy Online

- Assigning Religion to Judges & litigants (LSTM)

Identification Challenge

- Many simultaneous changes are occurring in the Month of Ramadan

  - Changes in beliefs about value of work (Campante and Yanagizawa-Drott, 2015)

  - Change in health (Van Ewijk, 2011)

  - Change in mood (Zhang et al., 2015)

  - Litigants may defer filing case in Ramadan (Hubbard, 2013)

  - Therefore, comparing decisions in Ramadan with decisions in non-Ramadan months does not necessarily capture the impact of the Ramadan fasting ritual.

Identification Strategy

- In order to isolate the effect of Ramadan fasting on acquittal verdicts:

    - Focus on changes in prescribed length of fasting within Ramadan

    - Rotating Islamic calendar over seasons, random case assignment and variation in intensity by district court's location

- For instance, when Ramadan falls in winter, the daily fasting will be longer in Karachi relative to Abbottabad because Karachi is closer to the equator

- Nevertheless, when Ramadan falls in summer, the opposite is true

- Therefore, the interaction of district court's latitude and the fact that the Islamic calendar is not synchronized with the solar cycle provides us plausibly exogenous variation in the prescribed strictness of fasting

Identification Variation
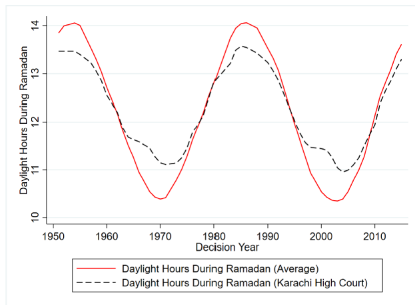
Note: Each line represents the average daily number of sunrise-to-sunset hours during the month of Ramadan in each year, measured at the location of the district courts.
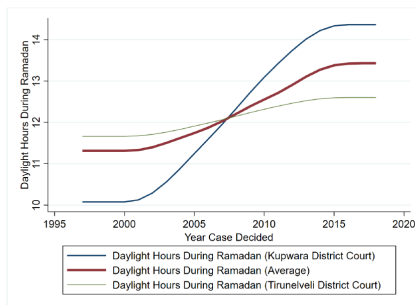
Note: Each line represents the average daily number of sunrise-to-sunset hours during the month of Ramadan in each year, measured at the location of the district court.

- In Pakistan, fast length across districts can differ by 1 hour (left)
- In India, the length of fast can differ by 2 hours since it is larger (right)

Empirical Methodology

$$Y_{cjdt} = \theta + \alpha \, Ramadan \, Hours_{dt}$$
$$+ \beta_d + \gamma_t + \delta_c + \mathbf{W'}_{cdt} \, \psi + \epsilon_{cjdt} \tag{1}$$

- Subscripts c, j, d and t indexes cases, judges, district and days, respectively

- Y represents Acquittal Verdicts at the case level

- Ramadan hours is average length of day in Ramadan

- β_d, γ_t and δ_c are district, day, week, month, year and case-type fixed effects, respectively

- **W** is a vector of case and judge controls (includes sunlight hours and Ramadan month fixed effect)

- α provides us the impact of Ramadan fasting on Acquittals at the intensive margin

Results - Pakistan

	Muslim Judges		Non-Muslim Judges	
	(1)	(2)	(3)	(4)
	Acquittal Verdicts - Pakistan			
Ramadan Hours	0.042**	0.042**	0.012	0.014
	(0.019)	(0.019)	(0.026)	(0.026)
District and Time FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Observations	3849	3849	1999	1999
R-squared	0.055	0.058	0.069	0.078
Mean of Dependent Variable	0.529	0.529	0.498	0.498
Number of Judges	597	597	320	320

Results - India

	Muslim Judges		Non-Muslim Judges	
	(1)	(2)	(3)	(4)
	Acquittal Verdicts			
Ramadan Hours	0.067*	0.066*	0.032	0.033
	(0.037)	(0.037)	(0.023)	(0.023)
District and Time FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Observations	20033	20033	352071	352071
R-squared	0.232	0.235	0.294	0.295
Mean of Dependent Variable	0.719	0.719	0.523	0.523
Number of Judges	433	433	7257	7257

Ramadan-Specific Effect - Pakistan

Ramadan Ritual and Aquittals
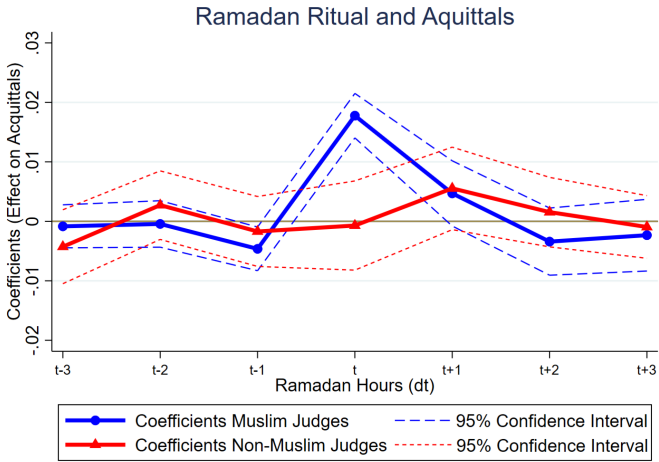
Ramadan-Specific Effect - India

	Muslim Judges		Non-Muslim Judges	
	(1)	(2)	(3)	(4)
	Acquittal Verdicts			
Jumada Hours (t-3)	-0.002	-0.002	-0.001	-0.001
	(0.002)	(0.002)	(0.001)	(0.001)
Rajab Hours (t-2)	-0.002	-0.006	-0.002	-0.002
	(0.002)	(0.002)	(0.001)	(0.001)
Shaban Hours (t-1)	-0.002	-0.002	-0.002	-0.001
	(0.002)	(0.002)	(0.001)	(0.001)
Ramadan Hours (t)	0.064*	0.061*	0.029	0.029
	(0.038)	(0.038)	(0.023)	(0.023)
Shawal Hours (t+1)	-0.002	-0.002	-0.002	-0.002
	(0.002)	(0.002)	(0.001)	(0.001)
Dhulqada Hours (t+2)	-0.003	-0.003	-0.002	-0.002
	(0.002)	(0.002)	(0.001)	(0.001)
Dhulhijja Hours (t+3)	0.001	0.001	-0.001	-0.001
	(0.002)	(0.002)	(0.001)	(0.001)
District and Time FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Observations	20033	20033	352071	352071
R-squared	0.233	0.236	0.294	0.295
Mean of dependent variable	0.719	0.719	0.523	0.523
Number of Judges	433	433	7257	7257

Direct Effect of Ramadan - Extensive Margin
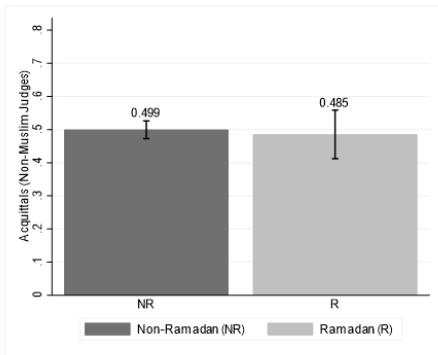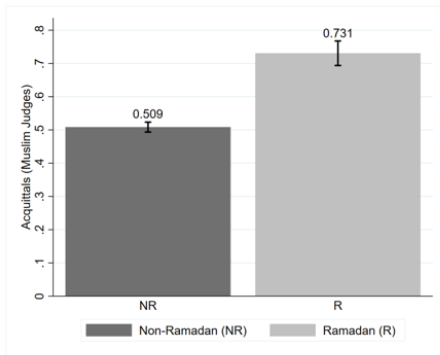
Note: The figures report average acquittal verdicts of cases decided in Ramadan and non-Ramadan months in Pakistan for Muslim (left) and non-Muslim judges (right).

High Court in Karachi

Lower Court in Karachi

Diff-in-Diff Effect of Decision Reversals in Higher Court - Intensive Margin

	(1)	(2)	(3)
		Overturned	
Muslim X Ramadan Hours	-0.016**	-0.017**	-0.017**
	(0.007)	(0.008)	(0.008)
District FE	Yes	Yes	Yes
Time FE	No	Yes	Yes
Controls	No	No	Yes
Observations	9110	9110	9110
R-squared	0.169	0.192	0.193
Mean of Dependent Variable	0.480	0.480	0.480
Number of Judges	2104	2104	2104

Diff-in-Diff - Decision Reversals in Higher Court - Extensive Margin
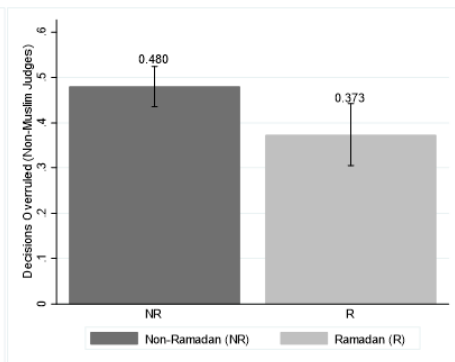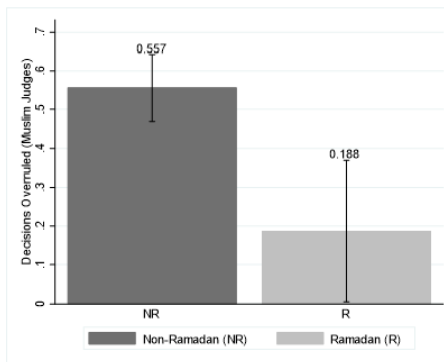
Note: The figures represent average overturned decisions in High Courts that were previously decided in Ramadan and those that were decided in non-Ramadan months in the Indian Lower Courts.

Fall in Recidivism

	Acquitted in lower Court		Convicted in lower Court	
	(1)	(2)	(3)	(4)
		Reoffense		
Muslim X Ramadan Hours	-0.00191**	-0.00194**	-0.00238*	-0.00231*
	(0.0007)	(0.0013)	(0.0013)	(0.0012)
District & Time FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Observations	192916	192916	169660	169660
R-squared	0.186	0.187	0.185	0.187
Mean of Dependent Variable	0.556	0.556	0.690	0.690
Number of Judges	5556	5556	4304	4304

Impact on Out-group Bias

	Muslim Judge		Non-Muslim Judge	
	(1)	(2)	(3)	(4)
	Muslim Litigant	Non-Muslim Litigant	Muslim Litigant	Non-Muslim Litigant
	Acquittals			
Ramadan Hours	0.057	0.100*	0.048	0.029
	(0.063)	(0.059)	(0.0377)	(0.023)
District and Time FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	6358	13027	89151	248921
R-squared	0.338	0.206	0.311	0.294
Mean of Dependent Variable	0.755	0.702	0.513	0.525
Number of Judges	264	327	4160	5721

The Physiological Deprivation Channel? - India

- This would have implied that the decision reversals for Muslim judges should have increased not decreased but still...

	Muslim Judges			Non-Muslim Judges		
	(1)	(2)	(3)	(4)	(5)	(6)
	Caseload	Days to First Hearing	Days Delay	Caseload	Days to First Hearing	Days Delay
Ramadan Hours	0.036	140.684	109.57	-0.805	138.55	-111.00
	(0.698)	(124.75)	(82.421)	(0.692)	(121.24)	(120.75)
District and Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12327	12327	12327	183153	183153	183153
R-squared	0.868	0.066	0.052	0.029	0.017	0.012
Number of Judges	428	428	428	7181	7181	7181

The Physiological Deprivation Channel? - Pakistan

	Muslim Judges		Non-Muslim Judges	
	(1)	(2)	(3)	(4)
	Caseload	*Case Delay*	*Caseload*	*Case Delay*
Ramadan Hours	-0.059	0.104	0.162	2.193
	(0.054)	(1.267)	(0.164)	(2.733)
District and Time FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	2980	2980	1463	1463
R-squared	0.237	0.227	0.358	0.355
Number of Judges	588	588	316	316

- Four sources of heterogeneity:

  1. By appeals - lower court acquittals vs convictions

  2. By judge experience

  3. By violent vs non-violent crimes

  4. By religious identity

Heterogeneity by Appeals

	Acquitted in lower Court		Convicted in lower Court	
	(1)	(2)	(3)	(4)
	Appealed			
Muslim X Ramadan Hours	-0.00013**	-0.00013**	-0.00007	-0.00007
	(0.00006)	(0.00006)	(0.00029)	(0.00029)
District and Time FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Observations	198608	198608	173496	173496
R-squared	0.046	0.046	0.059	0.060
Mean of Dependent Variable	0.003	0.003	0.004	0.004
Number of Judges	6410	6410	4911	4911

Heterogeneity by Judge Experience

| | Judge Experience | | | |
| | Less than Median | | Greater than Median | |
	(1)	(2)	(3)	(4)
		Acquittals		
Muslim X Ramadan Hours	0.212*	0.210*	-0.014	-0.015
	(0.110)	(0.111)	(0.066)	(0.066)
	p-value 0.054	p-value 0.058		
District and Time FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Observations	139941	139941	232163	232163
R-squared	0.370	0.372	0.288	0.289
Mean of Dependent Variable	0.501	0.501	0.554	0.554
Number of Judges	4231	4231	4489	4489

Heterogeneity by Case Severity

	Violent Crimes		Non-Violent Crimes	
	(1)	(2)	(3)	(4)
Panel A: Acquittal Verdicts in Lower Court				
Muslim X Ramadan Hours	0.0091*	0.0090*	0.0001	0.0001
	(0.0054)	(0.0054)	(0.0024)	(0.0024)
District and Time FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Observations	5260	5260	366844	366844
R-squared	0.577	0.577	0.533	0.533
Mean of Dependent Variable	0.485	0.498	0.289	0.290
Number of Judges	932	932	7650	7650
	(1)	(2)	(3)	(4)
Panel B: Appealed Verdicts in High Court				
Muslim X Ramadan Hours	-0.00094**	-0.00089**	-0.00003	-0.00003
	(0.0001)	(0.0001)	(0.0001)	(0.0002)
District and Time FE	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes
Observations	5260	5260	366844	366844
R-squared	0.132	0.132	0.533	0.533
Mean of Dependent Variable	0.003	0.003	0.289	0.290
Number of Judges	932	932	7650	7650

Heterogeneity by Religious Identity

	Muslim Judge		Non-Muslim Judge	
	(1)	(2)	(3)	(4)
	Muslim Litigant	Non-Muslim Litigant	Muslim Litigant	Non-Muslim Litigant
	Acquittals			
Ramadan Hours	0.057	0.100*	0.048	0.029
	(0.063)	(0.059)	(0.0377)	(0.023)
District and Time FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	6358	13027	89151	248921
R-squared	0.338	0.206	0.311	0.294
Mean of Dependent Variable	0.755	0.702	0.513	0.525
Number of Judges	264	327	4160	5721

Balance Check for Random Case Assignment - India

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Muslim Judge				
Rape	-0.036							-0.023
	(0.032)							(0.028)
Child Sexual Assault		-0.002						-0.002
		(0.106)						(0.106)
Robbery			-0.004					-0.003
			(0.004)					(0.004)
Assault				0.063				0.063
				(0.057)				(0.057)
Kidnapping					-0.040			-0.027*
					(0.029)			(0.015)
Theft						0.016		0.016
						(0.024)		(0.024)
Fraud							0.003	0.002
							(0.036)	(0.037)
District and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	372104	372104	372104	372104	372104	372104	372104	372104
R-squared	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
Mean of Dependent Variable	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054
Number of Judges	7683	7683	7683	7683	7683	7683	7683	7683
F-Statistic [p-values]	1.17[0.28]	0.001[0.99]	0.74[0.39]	1.21[0.27]	1.94[0.16]	0.46[0.49]	0.01[0.93]	1.17[0.32]

Balance Check for Case Composition in Ramadan - India

Panel A: Muslim Judges							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Rape	Child Sexual Assault	Robbery	Assault	Kidnapping	Theft	Fraud
Ramadan Hours	-0.0017	-0.0021	0.0074*	-0.0001	-0.0012	0.0018	-0.0007
	(0.0032)	(0.0015)	(0.0041)	(0.0001)	(0.0012)	(0.0014)	(0.0006)
District and Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	20033	20033	20033	20033	20033	20033	20033
R-squared	0.105	0.839	0.028	0.060	0.086	0.121	0.007
Number of Judges	433	433	433	433	433	433	433
Panel B: Non-Muslim Judges							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ramadan Hours	-0.0010	0.0002	0.00317	-0.0001	-0.0007	-0.0001	0.0001
	(0.0015)	(0.0009)	(0.0016)	(0.0001)	(0.0011)	(0.0008)	(0.0002)
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	352071	352071	352071	352071	352071	352071	352071
R-squared	0.306	0.075	0.106	0.003	0.289	0.027	0.004
Number of Judges	7257	7257	7257	7257	7257	7257	7257

Balance check for Case Composition in Ramadan - Pakistan

Panel A: Muslim Judges

	(1)	(2)	(3)	(4)	(5)
	# Pg. Judg.	Bench CJ	# Lawyer	# Judge	# Appeals
Ramadan Hours	0.508	-0.0172*	0.273	-0.0530*	0.0328
	(0.422)	(0.00815)	(0.174)	(0.0284)	(0.0361)
Fixed Effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Observations	3,849	3,849	3,849	3,849	3,849
R-squared	0.213	0.060	0.105	0.114	0.071
Mean of dep. variable	9.077	0.063	4.161	1.758	1.145

Panel B: Non-Muslim Judges

	# Pg. Judg.	Bench CJ	# Lawyer	# Judge	# Appeals
Ramadan Hours	-0.626	-0.0108	0.0651	-0.0470	-0.0242
	(0.560)	(0.011)	(0.162)	(0.0624)	(0.0513)
Fixed Effects	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Observations	1,999	1,999	1,999	1,999	1,999
R-squared	0.192	0.092	0.142	0.125	0.110
Mean of dep. variable	8.667	0.059	3.777	1.685	1.103

Conclusion

- Rituals appear to improve decision-making

    - Consistent evidence for both Pakistan and India

- Judicial acquittals **increase**

    - Reversed less often

        1. Leverage random case assignment to Muslim and non-Muslim judges.
        2. Rotating Islamic calendar removes seasonality and provides variation in ritual intensity
        3. Evidence against fasting as direct channel (no first-order impact on judge productivity).

- Policy implications:

    - Both judges and AI algorithms could be trained to overcome noise and judicial biases using decision heuristics that mimic rituals.

Conclusion

- "... we see 200 potential criminals let go on the first of Ramadan"
  Jhang Newspaper Headline, 15 April 2021, Justice Qazi Ameen

Thank You for Your Attention

- Twitter: **@mrsultan713**

- Email for more detailed questions/feedback: smehmood@nes.ru

- More information on my work:
  https://sites.google.com/view/sultan-mehmood/home