Global Science Sphere

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Means-Test Thresholds and Access to Civil Legal Aid: An Agent-Based Simulation of Coverage and Unmet Legal Need

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ARTICLE INFO

Keywords:
Legal aid, means test, access to justice, unmet legal need, missing middle, agent-based modelling, contribution schemes, SDG 16.3, Nigeria.

Vol. 01, **No**. 01, 2026

https://doi.org/10.5281/zenodo.23754623

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ABSTRACT

Civil legal aid schemes ration help through means tests, yet the consequences of where thresholds are set, and of how contributions and fixed budgets interact with them, are rarely examined before reform. This study develops an agent-based simulation of a synthetic adult population (100,000 agents, ten replications) in which justiciable problems arise with an income gradient, vary in seriousness and cost, and pass through help-seeking, application, contribution decisions and budget rationing to resolution or non-resolution. Behavioural parameters are illustrative assumptions informed by legal needs surveys, not estimates for any country, and all results are model outputs. Without aid, 67.6 % of legal needs went unrepresented, rising to 92.5 % in the poorest decile. A baseline scheme with a threshold of 0.55 times median income covered 10.6 % of needs, cut unmet need in the bottom quintile from 88.5 % to 60.3 % and yielded 11.6 additional resolved problems per 1,000 adults. It also created a missing middle: the third income decile, just above the threshold, had the highest unmet need of any decile (73.3 %). Raising the threshold to median income without additional money raised unmet need in the bottom quintile to 75.6 % and reduced additional resolutions to 8.8 per 1,000 adults, a result that held in 21 of 23 sensitivity runs. At equal budget, a tapered contribution schedule outperformed a cliff-edge threshold in all 23 runs (16.4 versus 12.6 additional resolutions per 1,000 adults at reference values). Thresholds, contributions and budgets should therefore be set jointly, and tapering is a more efficient response to the missing middle than raising a single cut-off.

Introduction

Most people experience legal problems in the course of ordinary life. Disputes over debts, housing, employment, family breakdown, consumer purchases and welfare benefits arise regularly. A substantial share of them are serious enough to affect health, income and family stability (Genn, 1999; Pleasence, 2006; Coumarelos et al., 2012). Legal needs surveys conducted in many countries show that many of these problems are never resolved through legal means: people do nothing, try to cope alone, or obtain advice that falls short of the help they need (OECD & Open Society Foundations, 2019; World Justice Project, 2019). In the United States,

low-income Americans received no legal help, or not enough, for 92 % of their substantial civil legal problems (Legal Services Corporation [LSC], 2022). Target 16.3 of the Sustainable Development Goals commits states to equal access to justice for all, which has turned unmet legal need into a measurable development objective (United Nations General Assembly, 2015).

Public civil legal aid is the principal instrument for closing this gap, and almost every scheme rations help through a means test. Applicants must show that their income and capital fall below specified thresholds, and those slightly above may be asked to contribute. A low threshold excludes many people who cannot afford a lawyer. A high threshold may draw in people who would have paid privately and exhaust a fixed budget. The 'missing middle' consists of households too well-off to qualify for aid but too poor to buy representation. It recurs in reform debates in England and Wales, Australia and the United States (Hadfield, 2010; Moorhead & Pleasence, 2003; Ministry of Justice, 2023). In Nigeria, the Legal Aid Act 2011 links eligibility for free aid to the national minimum wage and allows contributory aid above it, so the location of the threshold relative to a changing income distribution is a central design question.

The choice of means-test parameters is rarely informed by explicit modelling of how people with legal problems behave. Impact assessments typically count newly eligible people and project costs under fixed take-up (Ministry of Justice, 2023), without asking whether these people would have obtained help anyway, how a cash-limited budget is rationed, or how contributions deter applicants. These questions concern the interaction of individual heterogeneity, behaviour and institutional rules. Agent-based modelling, in which aggregate outcomes emerge from the decisions of heterogeneous agents, is therefore well suited to them (Epstein & Axtell, 1996; Gilbert, 2008).

This article develops an agent-based simulation of civil legal need, help-seeking and legal aid in a synthetic population and addresses four research questions. RQ1: How does the income threshold affect coverage, unmet need for representation and resolution, and do these effects differ between demand-led and cash-limited schemes? RQ2: Where in the income distribution is unmet need concentrated under a cliff-edge threshold, and does a 'missing middle' emerge? RQ3: How do contribution schemes and tapered eligibility compare with a single threshold? RQ4: How robust are the conclusions to uncertainty about behavioural parameters? The study shows that the budget regime can reverse the effect of raising a threshold, and it offers a transparent model that administrators can calibrate with their own survey data.

2. Background and Theoretical Framework

2.1 Legal needs and paths to justice

Research on access to justice starts from the justiciable problem: a problem that raises legal issues, whether or not the person concerned recognises them as legal or takes legal action (Genn, 1999). The concept extends the socio-legal account of how grievances are transformed into disputes through naming, blaming and claiming, with many falling away at each stage (Felstiner et al., 1980). The Paths to Justice methodology, first applied in England and Wales, has since been adapted in more than thirty jurisdictions (Genn, 1999; Pleasence et al., 2013).

Several robust findings emerge from this work. Disadvantaged groups experience more problems, problems cluster, and a small part of the population experiences a large share of them (Pleasence, 2006; Coumarelos et al., 2012). Responses depend on seriousness and on legal

capability, the knowledge, confidence and resources needed to act on legal issues (Pleasence & Balmer, 2014). Many people take no action because they do not see the problem as legal, expect help to be expensive, or doubt that it would help (Sandefur, 2014; LSC, 2022). Inequalities of class, race and gender shape both the experience of problems and the use of legal services (Sandefur, 2008). The OECD and Open Society Foundations (2019) guide synthesised more than fifty national surveys and proposed indicators that are now used to monitor SDG 16.3.

2.2 Means testing after universalism

Post-war legal aid schemes in Western Europe were part of the welfare state, and eligibility extended well into the middle of the income distribution. Since the 1980s, budgetary pressure has led most schemes to lower real thresholds, raise contributions, narrow scope and impose cash limits. This is the shift Moorhead and Pleasence (2003) describe as access to justice 'after universalism'. In England and Wales, the Legal Aid, Sentencing and Punishment of Offenders Act 2012 removed most social welfare law from scope (Ministry of Justice, 2019). The later Means Test Review raised thresholds, and the government estimated that it would make several million more people eligible (Ministry of Justice, 2023).

A means test has three components: an income threshold above which free aid is unavailable, a capital limit, and a contribution regime for applicants between a lower and an upper threshold. Thresholds fixed in nominal terms erode over time, and where they are linked to other benchmarks, such as the minimum wage in Nigeria, the link determines which part of the income distribution the scheme reaches. Contributions extend eligibility at lower public cost, but contributory aid has historically suffered from low take-up because applicants perceive contributions as unaffordable.

2.3 The missing middle

The missing middle arises from the interaction of a means-tested subsidy with a private market for legal services. Below the threshold, aid substitutes for representation that most applicants could not afford. Above it, people face market prices set largely by the cost of lawyer time, which bear little relation to modest household budgets (Hadfield, 2010; Rhode, 2004). People just above the threshold may therefore be worse placed than those just below it. Galanter (1974) showed that well-resourced repeat players come out ahead of one-shot players with modest means, and Cappelletti and Garth (1978) identified legal aid as the first 'wave' of reforms needed to make rights effective. Albiston and Sandefur (2013) argue that research should examine how institutions channel people towards or away from help. The means test is one such channel.

2.4 Legal framework

International human rights law does not require free representation in all civil cases, but access to court must be practical and effective. In Airey v. Ireland (1979), the European Court of Human Rights held that Article 6(1) of the Convention may require legal assistance where representation is indispensable because of the complexity of the procedure or the case. In Steel and Morris v. the United Kingdom (2005), the refusal of legal aid in complex defamation proceedings breached the right to a fair trial and equality of arms. The United Nations Principles and Guidelines on Access to Legal Aid in Criminal Justice Systems (United Nations General Assembly, 2012) concern criminal proceedings. They nevertheless express a principle of wider relevance: people above the threshold who cannot afford counsel should not be

denied help where the interests of justice require it. In Nigeria, section 36 of the Constitution of the Federal Republic of Nigeria 1999 guarantees a fair hearing in the determination of civil rights and obligations. The Legal Aid Act 2011 makes the Legal Aid Council responsible for aid, including civil assistance, within its resources. A means test that systematically leaves people without effective access in serious cases therefore raises questions of legality, not only of policy.

2.5 Agent-based modelling and the research gap

Agent-based models (ABMs) represent individuals as autonomous agents with heterogeneous attributes and behavioural rules. Macro-level patterns emerge from their decisions rather than being assumed (Epstein & Axtell, 1996; Bonabeau, 2002). ABMs are most useful where heterogeneity matters, decisions are discrete and rules interact non-linearly with individual circumstances (Gilbert, 2008; Gilbert & Troitzsch, 2005; Macal & North, 2010). Means-tested legal aid has all three features. Yet legal needs research relies mainly on survey regression and legal aid policy on static cost projections. Three gaps follow. Analyses of means-test reform rarely trace how eligibility becomes representation and resolution once behaviour and private alternatives are considered. The missing middle is discussed but seldom quantified. The interaction between thresholds and cash limits is largely unexplored. This study addresses these gaps and documents the model following the ODD protocol (Grimm et al., 2020).

3. Methodology

3.1 Research design and model purpose

The study is a computational modelling study. No empirical data on individuals were collected, and the synthetic population does not represent any specific country. The purpose of the model is to compare means-test designs under controlled conditions and to explain the mechanisms through which they affect coverage, unmet need and resolution. Forecasting the outcomes of a particular reform is not its aim. Parameters were chosen to reproduce qualitative regularities reported in legal needs surveys: an inverse income gradient in problem incidence, clustering of problems, help-seeking that rises with seriousness and capability, and widespread non-use of legal services among low-income groups (Genn, 1999; Pleasence, 2006; OECD & Open Society Foundations, 2019; LSC, 2022). Where no published estimate was available, values were set as explicit illustrative assumptions and then varied in sensitivity analysis. The model follows the ODD protocol (Grimm et al., 2020) and is summarised in Figure 1.

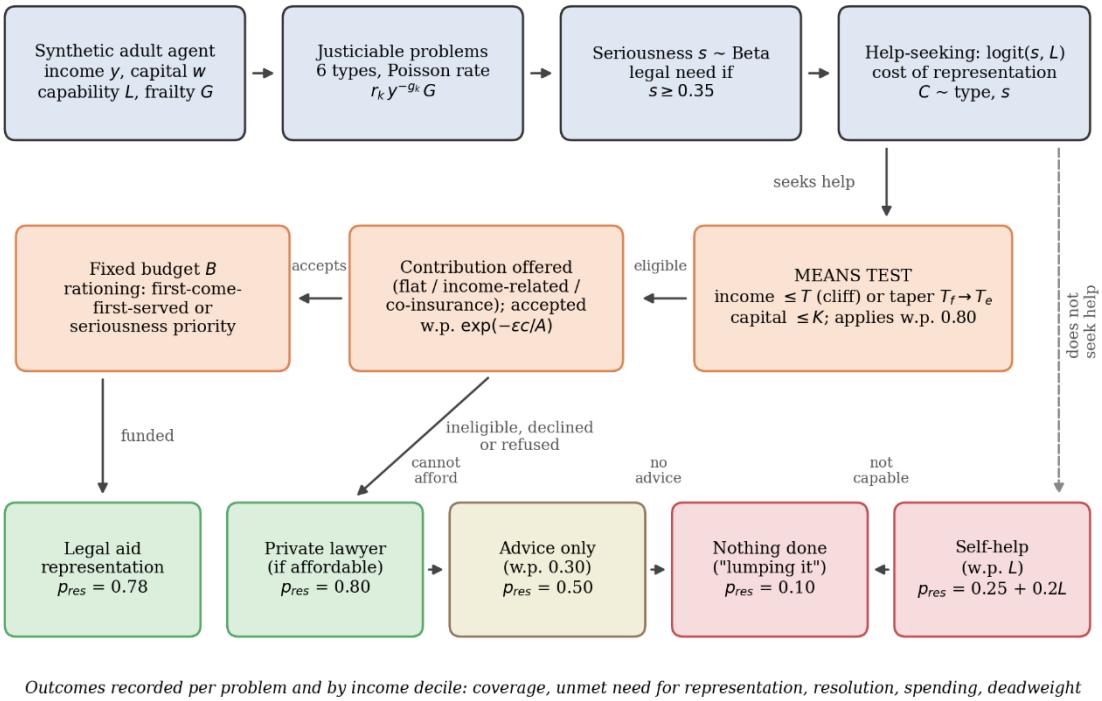


Figure 1. Structure of the agent-based model. Legal needs pass through help-seeking, the means test, contribution decisions and budget rationing, and end in one of five paths with different probabilities of resolution.

3.2 Entities, state variables and scales

The model contains two types of entity: adult agents and the legal problems they experience. Each agent has an annual income y, drawn from a log-normal distribution with median 1 and dispersion σ = 0.75 (Gini coefficient 0.40). All monetary quantities are expressed in multiples of median annual income, so the results do not depend on any currency. Agents also hold capital w, which is zero for 24.7 % of agents and otherwise increases with income. Each agent has a legal capability score L between 0 and 1, which rises with income but has substantial independent variation, and an individual frailty term G that captures the tendency of problems to cluster in the same people. The time scale is a single reference year. Each run uses 100,000 agents, and every experiment was replicated ten times with independent random seeds. Common random numbers were used across policies within a replication, so differences between policies are not due to different random draws.

3.3 Process overview and submodels

Problem generation. For each of six problem types (family, housing, employment, money and debt, welfare and administrative, and consumer), the number of problems experienced by an agent is drawn from a Poisson distribution with rate r_k·y^(−g_k)·G. The exponents g_k create an income gradient that is steepest for welfare and housing problems and slightly reversed for consumer problems, consistent with the patterns reported in legal needs surveys (Pleasence, 2006; Coumarelos et al., 2012). Each problem has a seriousness score s drawn from a type-specific Beta distribution. A problem constitutes a legal need when s ≥ 0.35.

Help-seeking and private purchase. The probability that an agent seeks help for a legal need rises with seriousness and capability according to a logistic function. The cost of representation C depends on problem type and seriousness, with log-normal variation

between cases; family problems are the most expensive and welfare problems the cheapest. Agents who seek help may buy private representation with a probability that rises steeply as their affordability A = 0.08y + 0.3w exceeds the cost.

Means test and application. An agent who seeks help passes the means test if income is at or below the threshold T and capital at or below K. Eligible agents apply with probability 0.80, reflecting the fact that some eligible people do not know about aid or do not apply. Under a taper, the share of the legal aid tariff paid by the scheme falls linearly from 100 % at a free-aid threshold T_f to zero at the upper eligibility threshold T_e, and the applicant pays the remainder as a contribution. Under the other contribution schemes, applicants above T_f pay a flat amount, a share of their income above T_f, or a fixed percentage of the cost. An applicant who is asked for a contribution c accepts the offer with probability exp(−εc/A), so that contributions large relative to affordability deter take-up.

Budget and rationing. In a demand-led scheme, all accepted applications are funded. In a cash-limited scheme, the budget B is allocated among accepted applications either on a first-come-first-served (FCFS) basis, implemented as a random order of arrival, or in descending order of seriousness (priority rule), until it is exhausted. The scheme pays a tariff of 0.65 times the market cost of representation, reflecting the lower rates usually paid by legal aid schemes, plus an administrative cost per application.

Paths and resolution. Each legal need ends in one of five paths. These are representation funded by legal aid, private representation, advice only (unrepresented seekers obtain advice with probability 0.30), self-help (agents who do not seek help attempt to resolve the problem alone with probability L) or no action. Each path has a probability of resolution. Representation, whether aided or private, has the highest probability, and no action the lowest. These probabilities are illustrative and do not represent the quality of particular providers. Table 1 lists all parameters.

Table 1. Model entities, parameters and sources

Element	Specification	Basis
Population	100,000 adult agents × 10 replications (seeds 101–110)	Design choice
Income y	Log-normal, median 1, σ = 0.75 (Gini 0.40); all money in multiples of median annual income	Stylised
Capital w	Held with prob. 1 − 0.5/(1 + y); log w = log 0.3 + 1.2 log y + ε; 24.7 % hold none	Assumption
Legal capability L	Logistic(0.8 log y + ε), range 0–1	Pleasence & Balmer (2014)
Problem clustering	Individual frailty G ~ Gamma(1.5, mean 1)	Pleasence (2006)
Problem rates	Family .05, housing .06, employment .06, money/debt .09, welfare/admin .05, consumer .12 per adult at median income	Genn (1999); OECD & OSF (2019)
Income gradient g_k	0.2, 0.5, 0.1, 0.4, 0.8, −0.1 (rate ∝ y^−g)	Assumption
Seriousness s	Beta by type, means 0.32–0.52; legal need if s ≥ 0.35	Assumption

Help-seeking	logit p = 4.0(s − 0.5) + 2.0(L − 0.5)	Genn (1999); LSC (2022)
Cost of representation C	c_k(0.5 + s)·LN(0, 0.5); c_k = .20, .10, .12, .06, .05, .06	Assumption
Private purchase	Affordability A = 0.08y + 0.3w; P = logistic[(log A − log C)/0.25]	Assumption
Legal-aid tariff / admin.	Aid pays 0.65 C; 0.004 per application	Assumption
Application / acceptance	Eligible seekers apply w.p. 0.80; contribution c accepted w.p. exp(−c/A)	Assumption
Advice / self-help	Unrepresented seekers get advice w.p. 0.30; non-seekers self-help w.p. L	Assumption
Resolution probabilities	Aid .78, private .80, advice .50, self-help .25 + .2L, nothing .10	Assumption

Note. Money in multiples of median annual income. 'Assumption' = illustrative value, varied in Table 5. LN = log-normal; w.p. = with probability.

3.4 Policy experiments

Table 2 summarises the experiments. The baseline scheme offers free aid to agents with income up to 0.55 times the median and capital up to 0.5 times median annual income (20.5 % of adults are financially eligible) and is demand-led. Its expenditure, $B_0 = 2.18$ median incomes per 1,000 adults, defines the reference budget for the cash-limited experiments, which vary the threshold, the budget, the contribution design, the taper and the capital limit.

Table 2. Policy scenarios and experiments

Experiment	**Specification**
No aid	Counterfactual: no public scheme
Baseline	Free aid if income ≤ 0.55 and capital ≤ 0.5 (20.5 % of adults eligible); demand-led
Threshold sweep	Cliff threshold T = 0.2–2.0 × median; demand-led, or fixed budget B_0 = 2.18 per 1,000 adults with FCFS or seriousness-priority rationing
Budget sweep	B = 0.5–3.0 × B_0 for T = 0.55 and T = 1.0
Contribution schemes	T = 1.0, free tier ≤ 0.55; above it: flat co-payment 0.01 (applies to all), income-related 25 % of income above 0.55, or 20 % co-insurance
Taper	Subsidy falls linearly from 100 % at 0.55 to 0 at T_e ∈ {0.8, 1.0, 1.25, 1.5, 2.0}; versus a cliff at T_e
Capital limit	K ∈ {0.1, 0.25, 0.5, 1.0, none} with T = 0.55

Note. Thresholds are in multiples of median income. B_0 = expenditure of the baseline scheme. FCFS = first-come-first-served.

3.5 Outcome measures

Five outcome measures were computed for each run. Coverage is the share of all legal needs that received legally aided representation. Unmet need for representation is the share of legal needs that received neither aided nor private representation; advice alone, self-help and

inaction count as unmet. This definition is deliberately demanding, since advice and self-help can be adequate for some problems (Pleasence et al., 2013). Resolution is measured as the number of additional problems resolved per 1,000 adults relative to the no-aid counterfactual on the same population. Spending per additional resolved problem, the ratio of scheme expenditure to additional resolutions, serves as a cost-effectiveness indicator. Deadweight is the share of aided problems whose owners would have bought private representation in the absence of aid. Distributional results are reported by income decile, for the bottom quintile (deciles 1–2) and for the 'missing middle', defined here as deciles 3–7.

3.6 Verification and sensitivity analysis

The implementation was verified by checking that aggregate quantities matched their analytical expectations, that outcomes in the no-aid scenario were identical across policy runs with common random numbers, and that the demand-led and cash-limited schemes coincided when the budget was not binding. Between-replication standard deviations were small: 0.2 percentage points for overall unmet need and 0.3 additional resolutions per 1,000 adults under the baseline. Differences larger than about one percentage point or one resolution per 1,000 adults are therefore not simulation noise. For the sensitivity analysis, eleven behavioural and cost parameters were varied one at a time to a low and a high value (Table 5), giving 23 parameter sets including the reference. For each set, the baseline, the expansion to median income at fixed budget, and the cliff and taper designs at $1.5B_0$ were re-simulated on five replications.

4. Results

4.1 Legal need in the synthetic population

The synthetic population experienced 0.45 justiciable problems per adult. 32.1 % of adults experienced at least one problem and 20.9 % at least one legal need, and 2.5 % experienced three or more problems. Legal needs numbered 25.8 per 100 adults. Their incidence declined steeply with income, from 0.38 needs per adult in the poorest decile to 0.18 in the richest (Figure 2a). Money and debt problems were the largest category (20.1 % of needs), followed by consumer (18.9 %) and housing problems (18.1 %).

Without legal aid, agents sought help for 53.5 % of their legal needs, obtained private representation for 32.4 % and advice only for 6.3 %. Unmet need for representation was 67.6 % overall and 59.7 % of needs remained unresolved. The income gradient was pronounced. Unmet need fell from 92.5 % in the poorest decile to 38.9 % in the richest (Figure 2b), so the poorest decile both experienced the most problems and was the least able to obtain help. These figures are model outputs. Their order of magnitude is consistent with the survey literature, which documents widespread non-use of legal services among low-income groups (Genn, 1999; LSC, 2022).

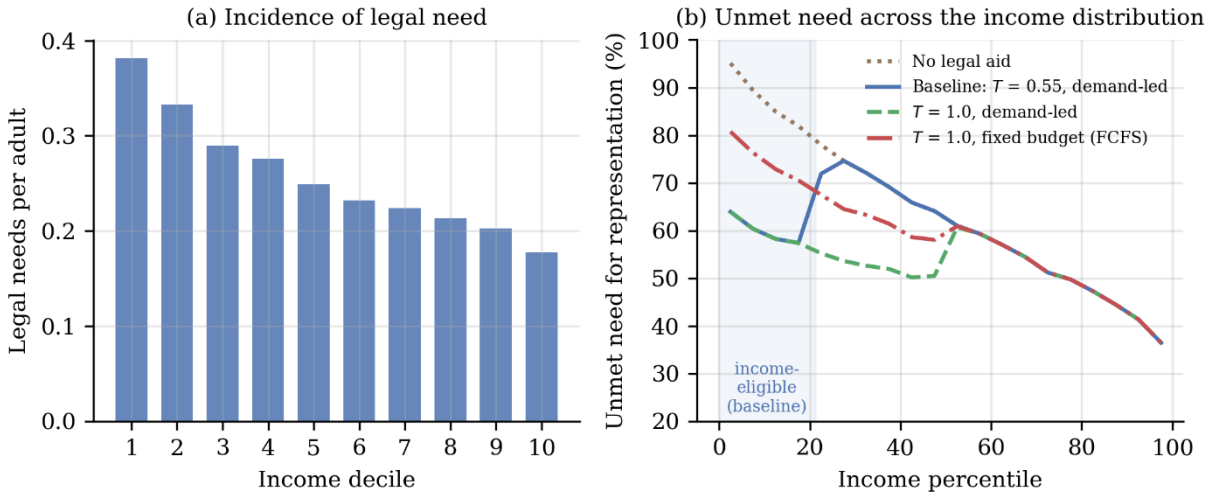


Figure 2. (a) Legal needs per adult by income decile. (b) Unmet need for representation by income vigintile under four scenarios; the shaded band marks the income-eligible group in the baseline.

4.2 The baseline scheme and the missing middle

The baseline scheme funded 27.4 aided cases per 1,000 adults and covered 10.6 % of all legal needs. Its expenditure was 2.18 median incomes per 1,000 adults. It reduced overall unmet need from 67.6 % to 59.4 % and unresolved needs from 59.7 % to 55.2 %, producing 11.6 additional resolved problems per 1,000 adults at a cost of 0.188 median incomes per additional resolution. Deadweight was 23.4 %. In the bottom quintile, unmet need fell from 88.5 % to 60.3 %.

The distributional profile of the baseline scheme, however, was not monotonic. Because the threshold fell close to the boundary between the second and third deciles (the upper bound of the second decile was 0.53 times the median), agents just above it received no help and faced the full market cost of representation. Unmet need was 73.3 % in the third decile and 70.6 % in the fourth. Both were higher than in the first (62.3 %) and second (57.8 %) deciles, and the third decile had the highest unmet need of any decile. Figure 2b shows the resulting 'cliff' in the vigintile profile. Unmet need fell to about 57 % at the threshold and then jumped by about 15 percentage points immediately above it. This is the missing middle in its sharpest form: a group just above the threshold was worse off than anyone below it. In the middle deciles (3–7), unmet need under the baseline (65.5 %) was virtually unchanged from the no-aid scenario (66.2 %).

4.3 Raising the threshold: demand-led versus cash-limited schemes

Figure 3 and Table 3 show the effects of moving the threshold. In a demand-led scheme, raising T increased coverage, reduced unmet need and increased resolution, with diminishing returns. Raising the threshold to median income (T = 1.0) increased coverage to 21.5 %, reduced unmet need in deciles 3–7 to 54.4 % and raised additional resolutions to 19.1 per 1,000 adults. Spending, however, rose to 4.50 median incomes per 1,000 adults, 2.06 times the baseline. The marginal cost of an additional resolution rose with each step: 0.31 median incomes between T = 0.55 and 1.0, 0.50 between 1.0 and 1.5, and 0.77 between 1.5 and 2.0. Deadweight rose from 11.3 % at T = 0.3 to 46.0 % at T = 2.0. Unmet need in the bottom quintile was unaffected by thresholds above 0.6, because the poorest agents were already eligible.

Under a fixed budget, the picture changed fundamentally. Once the threshold exceeded about 0.6, the budget was exhausted and every further increase in T admitted applicants who competed with the poor for the same funds. With FCFS rationing at T = 1.0, coverage fell slightly, to 9.8 %, and 30.1 eligible applications per 1,000 adults were refused for lack of funds. Unmet need in the bottom quintile rose from 60.3 % to 75.6 %, and additional resolutions fell from 11.6 to 8.8 per 1,000 adults. At T = 2.0, refusals reached 52.4 per 1,000 adults and additional resolutions fell to 7.1. The expansion did reduce unmet need in deciles 3–7 (to 60.8 % at T = 1.0). The gain in the middle was smaller than the loss at the bottom, however, because newly eligible applicants were more often deadweight and because their problems were no cheaper. In short, extending eligibility without extending the budget redistributed aid up the income distribution and reduced its total effect.

Prioritising the most serious problems did not offset this effect and in fact made it slightly worse. At T = 1.0, the priority rule covered 8.0 % of needs and produced 8.1 additional resolutions per 1,000 adults, compared with 9.8 % and 8.8 under FCFS. The reason is that seriousness and cost are positively related, so prioritising serious cases means funding fewer, more expensive cases. Spending per aided resolution was 0.136 median incomes under the priority rule against 0.111 under FCFS.

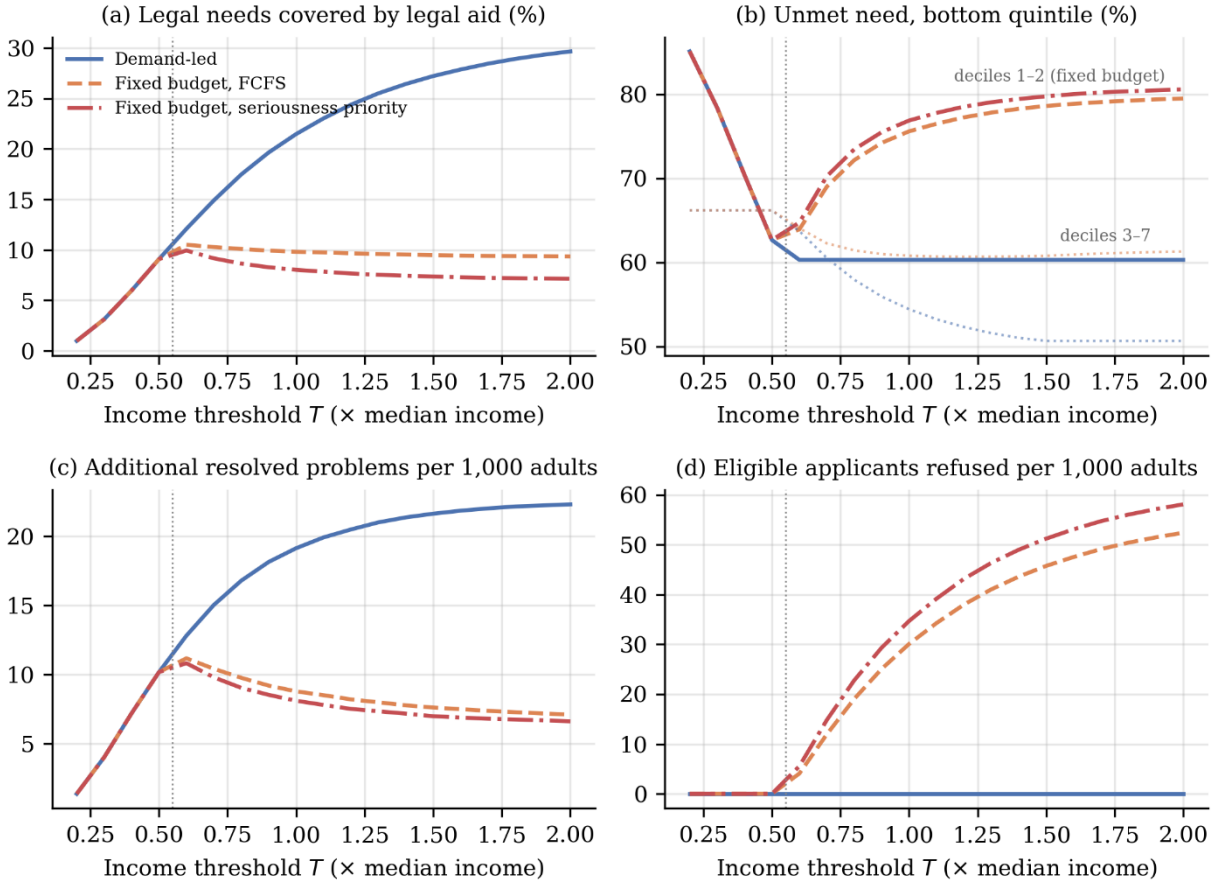


Figure 3. Effects of the income threshold under a demand-led scheme and a fixed budget B_0 with first-come-first-served (FCFS) or seriousness-priority rationing. (b) Thick lines: bottom quintile; dotted: deciles 3–7. (d) Applicants refused because the budget was exhausted. Vertical line: baseline threshold.

Table 3. Main outcomes by policy scenario (means of ten replications)

Scenario	Cov. %	Unmet %	Unmet D1–2 %	Unmet D3–7 %	Spend /1,000	Add. res. /1,000	Spend per add. res.	Dead-weight %	Refused /1,000
No aid	0.0	67.6	88.5	66.2	0.00	0.0	–	–	0.0
Baseline, T = 0.55 (demand-led)	10.6	59.4	60.3	65.5	2.18	11.6	0.188	23.4	0.0
T = 1.0, demand-led	21.5	54.0	60.3	54.4	4.50	19.1	0.235	36.7	0.0
T = 1.0, B_0, FCFS	9.8	61.3	75.6	60.8	2.18	8.8	0.249	36.6	30.1
T = 1.0, B_0, priority	8.0	61.8	76.9	61.1	2.18	8.1	0.270	28.7	34.7
T = 2.0, B_0, FCFS	9.3	62.5	79.5	61.3	2.18	7.1	0.308	45.8	52.4
Cliff T = 1.25, 1.5B_0	15.1	58.6	71.5	57.6	3.27	12.6	0.260	40.7	25.5
Taper 0.55→1.25, 1.5B_0	19.9	55.9	62.6	57.0	3.27	16.4	0.200	41.4	4.5

Note. Cov. = needs covered by legal aid; Unmet = needs without aided or private representation; D = income decile; Spend = expenditure in median annual incomes; Add. res. = additional resolved problems relative to no aid; Dead-weight = aided cases that would otherwise have been privately represented; B_0 = baseline spending.

4.4 The budget constraint

Figure 4 shows how outcomes depend on the size of the budget. With the baseline threshold, additional resolutions rose almost linearly with the budget up to B_0 and were flat thereafter, since all eligible applicants were funded at 1.25B_0. With a threshold at median income, the scheme needed about 2.5 times the baseline budget before it ceased to ration (4.50 median incomes per 1,000 adults), and it out-performed the baseline threshold only once the budget reached about 1.5B_0 (13.7 versus 11.6 additional resolutions per 1,000 adults at that budget). At half the baseline budget, the median-income threshold produced 3.9 additional resolutions per 1,000 adults against 5.5 for the baseline threshold. Cost-effectiveness followed the same pattern (Figure 4b). Spending per additional resolution was lowest for the baseline threshold at any budget and highest for the median-income threshold with priority rationing at small budgets (0.320 median incomes at 0.5B_0). The appropriate threshold is therefore a function of the budget.

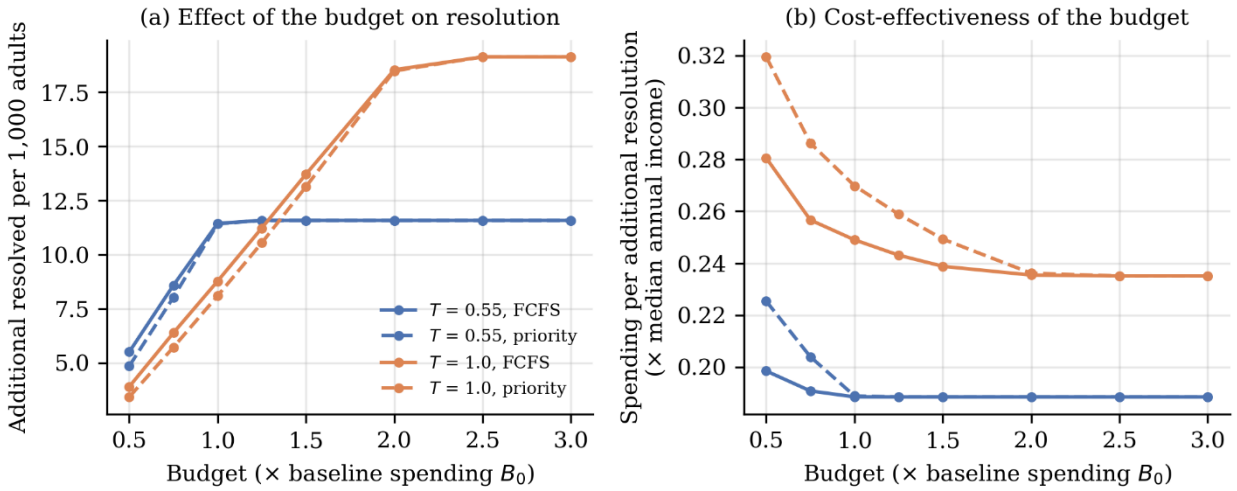


Figure 4. Effects of the budget for the baseline threshold (T = 0.55) and a median-income threshold (T = 1.0) with first-come-first-served (FCFS) or seriousness-priority rationing. (a) Additional resolved problems per 1,000 adults; (b) spending per additional resolved problem.

4.5 Contributions and tapers

Table 4 compares designs that extend eligibility to median income while asking those above 0.55 to contribute. At a fixed budget B_0, all three contribution schemes improved on a free scheme with the same upper threshold. The income-related scheme performed best, raising additional resolutions from 8.8 to 11.2 per 1,000 adults and coverage from 9.8 % to 12.4 %. It also reduced spending per additional resolution from 0.249 to 0.195, close to the baseline value. Contributions worked mainly by stretching a fixed budget over more cases. A less benign mechanism also contributed: some applicants declined the offer, which released funds for others. In a demand-led scheme, by contrast, contributions reduced the number of resolutions relative to free aid at the same threshold, for example from 19.1 to 16.2 with income-related contributions, while cutting spending from 4.50 to 3.07. The flat co-payment, which applied to all applicants including the poorest, raised unmet need in the bottom quintile in the demand-led scheme from 60.3 % to 67.8 %. It was the only design that harmed the poorest.

The taper produced the clearest gains. With a budget of $1.5B_0$ and an upper threshold of 1.25, a linear taper from 0.55 covered 19.9 % of needs against 15.1 % for a cliff-edge threshold at 1.25. It produced 16.4 rather than 12.6 additional resolutions per 1,000 adults, and kept unmet need in the bottom quintile at 62.6 % rather than 71.5 % (Figure 5b, Table 3). Spending per additional resolution was 0.200 against 0.260 median incomes. The taper also removed the cliff: unmet need declined smoothly across deciles 1–7. Figure 5a plots the spending–outcome frontier. Tapered schemes, and the income-related contribution scheme, lay above the curve traced by demand-led cliff thresholds. They achieved more resolutions for a given expenditure. For example, a demand-led taper to median income produced 16.3 additional resolutions per 1,000 adults for 3.12 median incomes, whereas a cliff threshold reached a similar outcome only at a higher spending level.

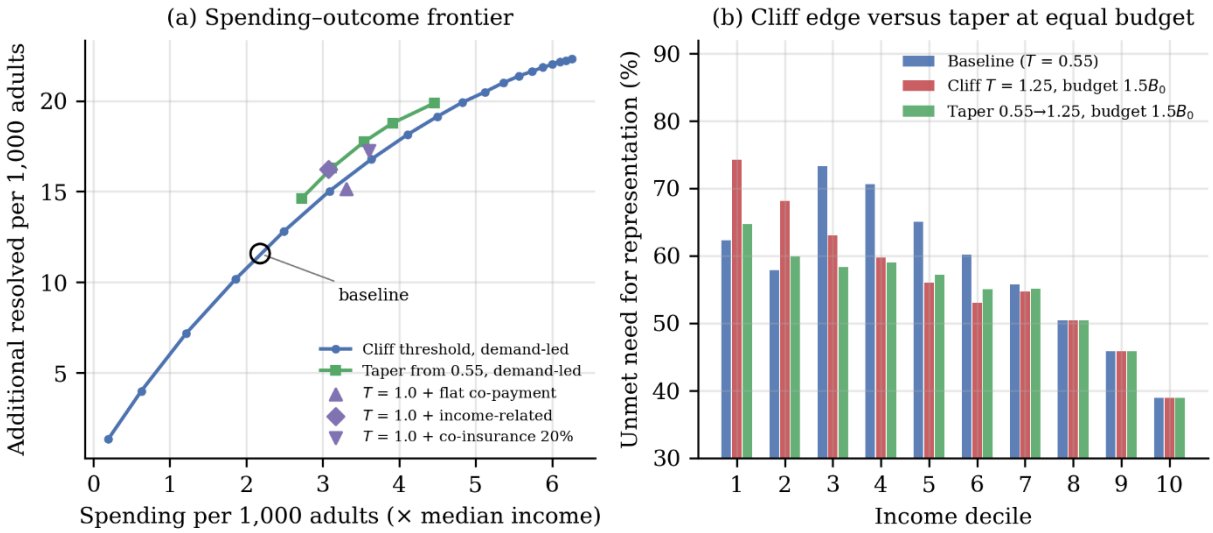


Figure 5. (a) Spending–outcome frontier for demand-led cliff thresholds (T = 0.2–2.0), demand-led tapers (T_e = 0.8–2.0) and contribution schemes. (b) Unmet need by income decile under the baseline and under a cliff and a taper with the same budget (1.5B_0).

Table 4. Contribution and taper designs (eligibility above 0.55 × median subject to contributions)

Design	Cov. %	Unmet %	Unmet D1–2 %	Spend /1,000	Add. res. /1,000	Spend per add. res.	Declined /1,000	Refused /1,000
B_0: no contribution	9.8	61.3	75.6	2.18	8.8	0.249	0.0	30.1
B_0: flat co-payment	11.3	60.7	75.4	2.18	9.6	0.227	9.5	16.7
B_0: income-related	12.4	59.6	69.1	2.18	11.2	0.195	8.9	14.5
B_0: co-insurance 20%	11.4	60.5	72.2	2.18	10.0	0.218	4.5	21.4
1.5B_0: no contribution	15.3	57.9	68.3	3.27	13.7	0.239	0.0	15.8
1.5B_0: flat co-payment	17.5	56.9	68.1	3.26	14.9	0.219	9.5	0.7
1.5B_0: income-related	18.0	56.0	60.3	3.07	16.2	0.189	8.9	0.0
1.5B_0: co-insurance 20%	17.8	56.5	63.1	3.27	15.6	0.210	4.5	5.0
demand-led: no contribution	21.5	54.0	60.3	4.50	19.1	0.235	0.0	0.0
demand-led: flat co-payment	17.8	56.8	67.8	3.31	15.1	0.219	9.5	0.0
demand-led: income-related	18.0	56.0	60.3	3.07	16.2	0.189	8.9	0.0
demand-led: co-insurance 20%	19.7	55.3	60.3	3.61	17.3	0.209	4.5	0.0
demand-led: taper 0.55→1.0	18.6	56.0	60.3	3.12	16.3	0.191	7.5	0.0
1.5B_0: taper 0.55→1.5	19.7	56.5	65.2	3.27	15.5	0.211	8.6	10.8

Note. All contribution designs offer free aid up to 0.55 × median income and contributory aid up to median income (1.0). Declined = contribution offers refused by applicants; Refused = applications refused because the budget was exhausted. Other abbreviations as in Table 3.

4.6 Capital limits and sensitivity

Capital limits mattered less than income thresholds, because most low-income agents held little capital, but they improved targeting. Tightening the limit from 0.5 to 0.1 times median annual income reduced coverage from 10.6 % to 7.8 %, cut deadweight from 23.4 % to 13.6 % and lowered spending per additional resolution from 0.188 to 0.165.

Table 5 reports the sensitivity analysis. Absolute outcomes were sensitive to several parameters, most strongly to the probability of resolution with aid, the share of income households can devote to legal costs, the legal aid tariff and the cost of representation. For example, additional resolutions under the baseline ranged from 8.7 to 14.2 per 1,000 adults as the resolution probability with aid varied from 0.68 to 0.88. The qualitative conclusions were more robust. Expanding eligibility to median income at a fixed budget reduced additional resolutions relative to the baseline in 21 of the 23 parameter sets. The two exceptions were a low application probability and low representation costs, under both of which the baseline budget was no longer fully used by the baseline-eligible group. The taper out-performed the cliff threshold at equal budget in additional resolutions in all 23 parameter sets, and had lower unmet need in the bottom quintile in 23 of 23.

Table 5. One-way sensitivity analysis: additional resolved problems per 1,000 adults (low / high parameter value)

Parameter	Low / high	Baseline T = 0.55	T = 1.0 at B_0	Cliff 1.25 at $1.5B_0$	Taper at $1.5B_0$
Reference values	–	11.5	8.8	12.6	16.3
Application probability	0.6 / 0.95	8.6 / 13.7	9.1 / 8.7	12.9 / 12.5	13.1 / 16.2
Contribution aversion ε	0.5 / 2	11.5 / 11.5	8.8 / 8.8	12.6 / 12.6	16.4 / 16.0
Purchase-decision noise	0.15 / 0.4	11.7 / 11.0	8.9 / 8.5	12.7 / 12.3	16.5 / 16.1
Income share for legal costs α	0.05 / 0.12	12.5 / 9.9	10.2 / 7.1	14.8 / 10.0	19.1 / 13.1
Seriousness effect on seeking	2 / 6	10.7 / 12.1	8.9 / 8.7	12.7 / 12.5	16.3 / 16.1
Capability effect on seeking	1 / 3	12.4 / 10.5	8.9 / 8.7	12.7 / 12.4	16.3 / 16.2
Resolution with aid	0.68 / 0.88	8.7 / 14.2	6.2 / 11.3	8.7 / 16.5	11.2 / 21.6
Resolution with private lawyer	0.7 / 0.9	12.1 / 10.8	9.7 / 7.8	14.2 / 11.0	18.5 / 14.2
Need threshold on s	0.25 / 0.45	12.8 / 9.5	8.7 / 8.8	12.5 / 12.7	16.3 / 14.6
Cost of representation (×)	0.7 / 1.3	9.5 / 12.6	9.7 / 7.8	13.6 / 11.3	13.9 / 14.6

Legal-aid tariff (share of C)	0.5 / 0.8	11.5 / 11.5	11.4 / 7.2	16.4 / 10.2	18.1 / 13.2

Note. Five replications per parameter set; reference values as in Table 1. Taper = linear from 0.55 to 1.25 × median income.

5. Discussion

5.1 Principal findings

The simulation yields four main findings. First, a low cliff-edge threshold substantially reduces unmet need among the poorest but leaves the near-poor just above it with the worst access of any income group. The missing middle long described in the literature (Hadfield, 2010; Moorhead & Pleasence, 2003) arises here simply from a threshold interacting with a private market and an income gradient in problems. Second, the effect of raising the threshold depends on the budget regime. In a demand-led scheme it improves every aggregate outcome at rising marginal cost; under a cash limit it reduces the number of problems resolved and shifts aid away from the poorest. Third, efficiency falls as eligibility extends upwards because deadweight rises, and priority for serious cases means funding fewer, costlier cases. Fourth, tapered contributions, and to a lesser extent income-related contributions, dominate a cliff threshold at equal cost.

5.2 Interpretation

The results offer a mechanism-based account of empirical regularities. Surveys find that the use of lawyers rises with income while the incidence of problems falls (Pleasence, 2006; Sandefur, 2008). In the model, this combination generates a steep gradient in unmet need, which a targeted scheme flattens at the bottom while leaving a step at the threshold. The analysis also qualifies a common argument in reform debates, that raising thresholds is in itself a measure to improve access. Under a fixed budget, the number of people eligible is not the number helped. An expansion without funding may convert unmet need among the poor into refusals, waiting lists or narrower scope, which are less visible but no less real. This matters for the Means Test Review in England and Wales (Ministry of Justice, 2023). It matters even more for schemes such as Nigeria's, whose budgets are set independently of demand and whose capacity is limited by the number of legal aid lawyers.

5.3 Implications for policy and law

Four design principles follow. First, thresholds and budgets should be set jointly. Free aid should be extended only if funding rises accordingly; otherwise expansion should take the form of a taper or income-related contributions. Second, a taper is a more efficient response to the missing middle than a higher cut-off, because it reaches the near-poor at a fraction of the cost of free aid and removes the cliff at which a small rise in income removes all help. Third, contributions should be proportional to ability to pay above a protected minimum. Flat co-payments that reach the poorest are regressive and, in the model, increased unmet need among them. Fourth, rationing rules should be chosen explicitly. Prioritising serious problems may be justified where housing, family life or liberty are at stake, but it reduces the number of problems resolved, and this trade-off should be made openly.

For Nigeria, the analysis suggests three lines of reform. The single cut-off at the minimum wage could be replaced by a taper with income-related contributions for low-wage workers just above it. Thresholds could be indexed to household income rather than to a wage that is adjusted irregularly. Data on applications, refusals and outcomes could be collected

systematically. A national legal needs survey following the OECD and Open Society Foundations (2019) framework would allow the model to be calibrated and progress on SDG 16.3 to be monitored. The findings also bear on the standards in Section 2.4. A cliff-edge test that leaves the group just above the threshold with the highest unmet need risks denying effective access, in the sense of Airey v. Ireland (1979), to people whose means differ little from those of eligible applicants. A residual interests-of-justice discretion above the threshold, combined with a taper, would bring means testing closer to these standards.

Methodologically, the study shows that agent-based modelling can capture threshold effects, behavioural responses and competition for a budget, which static cost projections miss. Calibrated to survey and administrative data, the same framework could compare merits tests, scope rules and delivery models such as advice services, paralegals and online tools (Pleasence et al., 2013).

5.4 Limitations

The study has important limitations. First, it simulates a synthetic population. Its parameters are illustrative assumptions chosen to reproduce qualitative survey patterns, not estimates for any country, and its numbers are not predictions for any real scheme. Absolute outcomes depend strongly on the effectiveness of aided representation and on the share of income households can devote to legal costs; only the qualitative comparisons proved robust. Second, the model is static. It omits the cascading of unresolved problems over time and the feedback from refusals to future help-seeking. Third, representation is treated as uniformly effective, although its value varies by problem, forum and provider, and some problems are adequately resolved with advice or self-help. Fourth, supply is represented only by a budget and a tariff. The availability of lawyers, geography and waiting times are not modelled, although they are binding in many countries, including Nigeria. Fifth, the means test is simplified and omits allowances, household composition, passporting and discretionary waivers. Sixth, one-way sensitivity analysis ignores interactions between parameters. Probabilistic sensitivity analysis and calibration to survey data are priorities for future work.

6. Conclusion

Means tests are the gatekeepers of civil legal aid. This simulation shows that a low cliff-edge threshold protects the poorest but creates a missing middle in which the near-poor have the worst access of any group. Raising the threshold improves outcomes only if the budget rises with it. Under a fixed budget, wider eligibility reduces the number of problems resolved and shifts aid away from those least able to pay. Tapered and income-related contributions extend help to the near-poor at lower cost and without the cliff, and the taper out-performed the cliff in every parameter set examined.

The model is stylised and its numbers are indicative. The direction of the effects, however, follows from well-documented mechanisms: an income gradient in legal problems, a private market priced beyond modest budgets, deadweight, deterrence by contributions and competition for limited funds. Policy makers pursuing SDG target 16.3 and effective access to court should set thresholds, contributions and budgets together, prefer tapers to cliffs, protect the poorest from flat charges, and invest in the data needed to evaluate these choices.

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