# The Wages of Repression [*]

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## Abstract

Incidents of government repression vary in which individuals are targeted. Building on a conceptual distinction between targeted repression (against opposition group members) and mass repression (against citizens broadly), I develop a framework that explains why regimes use both types of repression in combination. Targeted and mass repression have distinct effects on civilians' incentives to support an opposition. Citizens trade off ideological benefits from challenging the regime and material benefits from participating in the economy. Targeted repression decreases the benefit of challenging the regime, activating security concerns. Mass repression affects individuals' material wellbeing, improving opportunities for participants in the economy. These participation and material wellbeing mechanisms make targeted and mass repression jointly optimal for the regime. By identifying distinct logics for targeted and mass repression, I show in some cases, targeted and mass repression are complements, meaning it is optimal for governments to employ more of both types of repression simultaneously.

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Autocratic regimes often rely on an array of repressive tactics in response to internal challenges. Though many incidents of repression are observable, the rationale behind a government's strategy—its choice from a repertoire of repressive tactics—often remains opaque (Pierskalla, 2010; Fariss and Schnakenberg, 2014; Ritter, 2014). For example, why do some regimes repress by detaining or jailing dissidents while others forcibly displace citizens in an attempt to identify, and deny support to, internal challengers? A key dimension on which repressive strategies vary is the identity of the government's targets. In some cases, repression is targeted, directed only at members of an opposition group. Other incidents are characterized by mass repression, in which the regime targets citizens broadly, repressing both opposition members and non-members.[1] Moreover, these tactics are not mutually exclusive, and in some conflict contexts governments pursue both targeted and mass repression simultaneously.

Conventional wisdom suggests that targeted repression is more effective than mass repression at achieving the government's ends, and a choice to use mass repression indicates some deficiency of the regime (Kalyvas, 2006). Yet, puzzlingly, mass repression, employed alone or in combination with targeted repression, is applied by a diverse set of regimes, under varied circumstances (Lyall, 2009; Zhukov, 2015; Esteban, Morelli and Rohner, 2015). I argue targeted and mass repression have distinct effects on the incentives of the citizens repressive regimes seek to control. Specifically, while targeted and mass repression both alter the opportunity cost of participating in an opposition group, they operate through separate channels. Regimes, therefore, have different incentives for employing each tactic. Moreover, governments gain by using targeted and mass repression together. If mass repression were a mistake or sub-par alternative, it would be natural for regimes to substitute targeted repression for mass repression whenever feasible. Instead, I show targeted and mass repression

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[1]These types of repression largely map onto the descriptions of discriminate and indiscriminate violence in the context of armed civil conflict (Kalyvas, 2006; Lyall, 2009; Zhukov, 2015). However, targeted and mass repression admit more forms of repression than lethal physical violence.

can be complements. This complementarity holds when the cost of targeted repression is low and when, at high levels of mass repression, targeted repression discourages more citizens from joining the opposition. That is, the marginal effect of increasing targeted repression on citizens' participation decision is larger when levels of mass repression are high. Because of the distinct ways targeted and mass repression affect citizens, they are not merely options governments trade off. Regimes can have strong incentives to choose to employ higher levels of both targeted and mass repression simultaneously.

I develop a framework which, relying on the individual effects of targeted and mass repression on citizens, explains not only the incidence of targeted and mass repression, but also their co-occurrence. Citizens are naturally concerned for their own security. This concern interacts with two other incentives citizens must consider in choosing whether to support an opposition group—their own affinity for the government and concerns for material wellbeing (Becker, 1968; Grossman, 1991). These three motivations, security, ideology, and material wellbeing, present citizens with a tradeoff. Joining the opposition provides some ideological benefit. Alternatively, individuals that opt not to join the opposition receive some material benefit from participation in the economy. Opposition group membership, in part, determines an individual's potential exposure to repression because targeted repression is only directed at those who challenge the government.[2] Thus, opposition participation increases the risk of suffering repression, while citizens who participate in the economy avoid exposure to targeted repression. Each individual's relative weighting of these benefits and costs determines whether she joins the opposition or the labor force.

This tradeoff is what the government seeks to manipulate via its repressive tactics. While other scholars have focused on how states can manipulate individuals' ideological incentives

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[2]I abstract here from a specific form of repression. While states can employ a wide variety of repressive tactics, I am interested in differences in scope and scale of repression tactics, not across other dimensions like visibility or lethality. For a discussion of repression generally see Davenport (2007).

by winning hearts and minds (e.g. Berman, Shapiro and Felter, 2011) or through propaganda campaigns (e.g. Little, 2017), I isolate the effects of coercive force on individuals' decision to join the opposition. Since an individual citizen's relative weighting of ideological and material benefits is not fixed, if repression affects this weighting it can be a powerful, if blunt, tool for the government. Both the government and citizens influence, but neither controls, the economy, which generates material benefits for those who opt into the labor force. Targeted repression activates citizens' security concerns, which makes joining the opposition riskier. This creates a *participation incentive* that drives individuals who value their ideological benefits at near equal the material benefits from the economy to join the labor force. However, as more citizens prefer participating in the economy, the participation incentive generates a negative feedback loop that reduces this participation effect of targeted repression. The increase in citizens opting in to the labor force floods the labor market, reducing material benefits for all individuals in the economy. The citizens most ideologically inclined toward the opposition then cannot earn a wage high enough to prevent them from joining the group anyway, despite the risks. In this way, targeted repression is an imperfect instrument for a repressive government.

Mass repression, because it is directed at opposition members and civilians alike, does not activate security concerns in the same way as targeted repression. Thus, it has no direct effect on participation in the economy. However, mass repression does affect the economy in a manner distinct from targeted repression. Mass repression's downside, from the government's perspective, is that it removes individuals from the labor force, as well as targeting opposition members.[3] But this adjustment in the labor supply increases the availability of material benefits to non-opposition members in response to the new level of employment. This improves the material wellbeing of citizens who participate in the labor

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[3]There may be rational reasons, that are beyond the scope of this paper, for an autocrat to employ mass repression outside of its labor market effects. For an example see Gregory, Schröder and Sonin (2011).

force. The *material wellbeing incentive* generated by mass repression sufficiently encourages economic participation which, for the government, outweighs its costs. Moreover, mass repression seems to compensate for the increase in labor market participation generated by targeted repression. As mass repression reduces the potential labor supply by blocking repressed civilians from participating in the economy, it creates opportunities in the labor market for some individuals to sort out of the opposition in response to targeted repression.

Targeted and mass repression, used together, solve two problems for the regime. First, targeted repression directly reduces the size of the opposition. Second, mass repression compensates for the economic distortions created by targeted repression. Thus, repression's effects are subtler than simply modifying citizens' risk of victimization. The participation and material wellbeing incentives capture how repression alters the opportunity cost of conflict by directly manipulating citizens' material incentives. These distinct strategic logics for targeted and mass repression identified in my framework, as well as their potential complementarity, represent a significant departure from existing literature that largely views mass repression as a result of some lack of state capacity, particularly due to high costs of targeted repression. Even when targeted repression is costly, the participation and material wellbeing mechanisms make both types of repression optimal for the government. What's more, I can recover the standard logic of mass repression, but only by shutting down these mechanisms and masking repression's effects on the economy.

In line with observed incidents of repression, targeted and mass repression are not always complementary. Under some conditions, governments will substitute targeted repression for mass repression, or vice versa. Repression is costly so the government confronts its own tradeoff. Targeted repression carries a direct cost of identifying opposition members while mass repression requires the regime to accept, as a consequence of targeting some proportion of its own potential labor supply, a reduction in future income. When targeted repression is

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sufficiently costly, the regime will substitute, employing more mass repression than targeted repression. When the cost of targeted repression is low, if mass repression has a decelerating effect on the participation incentive, the regime will substitute targeted repression for mass repression. Consequently, my framework explains considerable variation in a government's potential repression choice, indicating circumstances under which we should see higher levels of targeted and mass repression, or both.

The remainder of the article proceeds as follows. The next section considers the literature on repression and economic motives for challenging regimes. I then introduce the model and the participation and material wellbeing mechanisms through which repression affects citizens' preferences. This is followed by results on complementarity and substitutability between targeted and mass repression. The final section concludes.

# Related Literature

In the face of internal challenges, regimes often turn to repression to maintain their hold on power (Davenport, 2007; Hill and Jones, 2014). Under such circumstances, regimes may employ mass or indiscriminate repression, though why they adopt these tactics, and their effectiveness, remain open questions (Condra and Shapiro, 2012; Finkel, 2015; Dragu, 2017; Rueda, 2017; Zhukov and Talibova, 2018). Explanations for mass repression include an inability to change strategies once a regime has adopted indiscriminate tactics, poor control over individual soldiers, or desperation during a losing campaign (Kalyvas, 2004; Valentino, Huth and Balch-Lindsay, 2004).

All repression is costly for governments to carry out. The use of repression requires regimes to overcome agency problems (Tyson, 2018) or institutional constraints within government (Ritter and Conrad, 2016). Notably, much of the literature contends indiscriminate repression

is less costly than discriminating repressive tactics (Kalyvas, 2006). The high cost of selective repression stems from the difficulty of collecting intelligence to distinguish between civilians and insurgents (Downes, 2007, 2008). Explanations of regimes' repressive strategies, then, implicitly rely on a notion of a budget for repression that requires substituting less costly mass repression for targeted repression. Repressing indiscriminately may reduce the cost of fighting or minimize casualties for state armed forces (Valentino, 2004; Eck and Hultman, 2007). The literature sees indiscriminate repression as a result of some deficiency of the state—a lack of capacity, intelligence, or ability to withstand casualties. I provide a framework that challenges this assumption, showing mass repression can be optimal, and complement more targeted repression, depending on repression's effects on citizen's incentives.

Opportunity cost provides a well-established explanation for opposition group participation (Blattman and Miguel, 2010). Citizens with limited economic opportunities face lower cost for leaving the economy to join the opposition. The opportunity cost mechanism has been tested using a number of (often exogenous) proxies for opportunity cost. These include low GDP per capita (Collier and Hoeffler, 1998, 2004; Collier, Hoeffler and Rohner, 2009), negative income shocks (Chassang and Padro-i Miquel, 2009), and wage suppression resulting from changes in import prices (Besley and Persson, 2008). Examining labor demand more directly, Dal Bó and Dal Bó (2011) find positive shocks to labor-intensive industries reduce the risk of repression, while shocks that reduce commodity prices for labor-intensive industries are linked with an increase in repression (Dube and Vargas, 2013).

Bueno De Mesquita (2005) endogenizes the opportunity cost of opposition participation in the context of terrorism, showing a link between economic downturn and an increase in terror attacks. I similarly endogenize the opportunity cost of opposition participation and, by doing so, demonstrate that repression is not merely a response to opposition groups but also alters the opportunity cost of conflict, affecting the composition of the opposition itself.

# The Model

I develop a framework in which a government chooses whether and how to repress and citizens choose to participate in an opposition group or supply labor to the economy. The citizens' decision is determined by a tradeoff between ideological and economic motives. The government cannot take any action to prevent the establishment of the opposition group but can respond to its presence. In reaction to the opposition, the regime chooses a repression strategy designed to manipulate citizens' incentives. In particular, the government's policy of repression affects citizens' security and material wellbeing. The government's chosen repression policy shifts the opportunity cost for individual citizens of joining the opposition through its effect on the economy. The regime chooses levels of targeted and mass repression that maximize participation in the economy. In this framework, I constrain the state such that its only available means of influencing citizens is repression.[4]

The game proceeds as follows: (1) The government chooses levels of targeted repression and mass repression to employ against the population; (2) Citizens decide to participate in the labor market or join the opposition and markets clear; (3) Payoffs are received.

There is a unit mass of citizens normalized to 1 prior to any government repression. Every individual is endowed with an ideology $\theta_i$ distributed uniformly from $[\underline{\theta}, \bar{\theta}]$.[5] Higher values of $\theta$ indicate a greater degree of sympathy for the opposition group.[6] Individuals who opt to participate in the opposition receive an ideological benefit of participation equivalent to their ideology, $\theta_i$. Citizens who do not join the opposition group participate in an economy, where

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[4] Allowing the government to make investments that improve citizens' material wellbeing, instead of just using repression, resembles a 'hearts and minds' style of counterinsurgency, which focuses on provision of public goods or services (Berman, Shapiro and Felter, 2011).

[5] I use ideology to describe various social and cultural factors like ethnicity, peer network effects, and anti-state attitudes, which captures an individual's view of the opposition's mission.

[6] Ideology can be considered a commonly known type for each individual. Conceiving of $\theta_i$ as a privately known type requires Bayesian perfection as a solution concept but does not alter the results.

individuals supply labor, earn a wage, and consume goods. A citizen's individual utility from economic participation is represented by $u(c)$, where utility is a strictly increasing, strictly concave function of consumption. Citizens trade off economic and ideological incentives when choosing whether to support the regime or the opposition. I denote the choice to join the opposition as $e = 0$, while $e = 1$ represents a decision to work. This decision generates a cutoff in $\theta$ that represents mobilization for the opposition. The proportion of citizens who participate in the labor force is represented by $\lambda$, where $\lambda = \int_0^1 e_i di$.

The government values economic output because a strong economy implies the government is more likely to remain in power and reap the benefits of office (Londregan and Poole, 1990; O'Kane, 1993; Marinov, 2005; Miller, 2012). To capture this preference, I represent the government's utility as benefits from economic production, $Y$. This can be thought of as benefits it can spend or distribute to remain in power, or as spoils of office.[7]

In response to the opposition group, the regime chooses both forms and levels of repression to employ against the population. The government can use two tactics, targeted or mass repression. The outcome of repression could take the form of imprisonment, exile, revocation of citizenship or work status, or physical repression. Both forms of repression succeed with certainty at removing the targeted population from the political and economic spheres. For the purpose of this analysis, the breadth of the application of repression is of primary interest, rather than the severity or lethality of individual repressive practices.

If the state chooses to use *targeted repression*, it targets some portion $t$ of the opposition group and has no effect on civilians participating in the economy. Targeted repression carries a linear cost $k(t)$ for the state to carry out—this cost can be thought of as the price of gathering

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[7]A theoretical explanation of how regimes can be expected to distribute these benefits can be found in Bueno De Mesquita, Smith, Morrow and Siverson (2005).

intelligence or identifying opposition members.[8] The opposition group's strength after the regime has carried out targeted repression is $1 - t$. Using *mass repression* has a broader effect and targets a fraction of the population that includes both opposition members and civilians. The level of mass repression is represented by $m$. The non-opposition population after government repression is $1 - m$. If the regime elects to use targeted and mass repression concurrently, the size of the opposition following the use of force is $(1-t)(1-m)$.

Given the government's chosen levels of repression, a citizen's expected utility is

$$U(e_i, \theta_i) = e_i\Big((1-m)u\big(c(t,m)\big)\Big) + (1-e_i)\Big((1-m)(1-t)\theta_i\Big).$$

The economy consists of a labor market, production technology, and a goods market. The economy endogenously determines wages, the supply of goods, and prices for those goods for a given production technology, a potential labor pool, individuals' preferences, and the government's repression choices. The economy's labor supply, $L = (1-m)\lambda$, depends on the size of the potential labor pool and the labor force participation rate. There is a technology that produces a single good, $y$, using the labor input. This technology is represented by $Y(L)$, where $Y(\cdot)$ is any strictly increasing, strictly concave production function.[9]

A profit-maximizing firm demands labor at a rate $L^\dagger$, and hires citizens to produce output via this production technology. Citizens who opt to work earn a wage, $w(L)$, where

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[8]Extending the model by assuming the cost is a convex function of the level of repression is fairly straightforward and changes the analysis in two ways, but does not fundamentally alter the results. First, the diminishing returns from targeted repression are compounded by the increasing costs for the regime. Second, evaluating the complementarity/substitutability of targeted and mass repression would require considering the regime's choice for a first-order stochastic shift in the distribution of cost.

[9]I include an analysis with specific functional forms in the supplementary appendix.

$w(\cdot)$ is strictly decreasing in $L$.[10] The firm is independent of the citizenry and the government, and absorbs all profits from production.[11]

Individuals who participate in the economy have a consumption budget $w(L) \geq p \cdot c$ such that the amount consumed for a given price $p$ cannot exceed the wage. Because utility is increasing in consumption, by Walras's law the budget will be satisfied with equality for each citizen. Citizens consume goods such that supply and demand for goods are equal.

**Lemma 1** *Market clearing is characterized by:*

1. *Optimal labor force participation:* $\lambda^*$

2. *Labor supply equals labor demand:* $(1 - m)\lambda^* = L^{\dagger}$

3. *Goods supplied equal goods demanded:* $w^* = p \cdot Y'(L)$

Proof of this lemma is in the appendix.

The solution concept is subgame perfect Nash equilibrium. An equilibrium to the model is defined by the quintuple $(w^*(t, m), c^*(t, m), \theta^*(t, m), t^*, m^*)$, which is an optimal wage and individual consumption given the regime's repression strategy, the marginal individual who is indifferent between supporting the regime and the opposition, conditional on the repression choice, and optimal levels of targeted and mass repression. This equilibrium has three components. First, market clearing conditions defined in Lemma 1 must hold. Second, a cutoff strategy in $\theta$ determines the portion of citizens participating in the economy. The marginal citizen who is indifferent between supporting the state and the opposition group

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[10]This is a standard implication of competitive markets, though results do not rest on the competitive labor market assumption. Instead, the only necessary feature of the production function is strict concavity. By this characteristic, wages decrease in labor supply.

[11]Results do not change if the firm is owned by citizens and profits are returned to those participating in the economy. Returning profits to the citizens only adds a positive term to an individual's expected utility, which would act as a scaling constant.

has a type that solves

$$\underbrace{(1-m)u\big(c(t,m)\big)}_{\text{material incentives}} = \underbrace{(1-m)(1-t)\theta^*}_{\text{ideological incentives}}. \tag{1}$$

Third, the government chooses levels of targeted and mass repression that solve

$$\max_{t,m} \quad Y\big((1-m)\lambda(t,m)\big) - k(t), \tag{2}$$

where $Y(\cdot)$ is the production function.

## Assumptions of the Model

Before continuing, I offer a few comments on the model's assumptions. One aim of this model is to isolate the effect of government repression on the decision of citizens to participate in an opposition group. Therefore, I do not explicitly model the opposition group as an independent player in the model because, without changing the fundamental focus of the model, doing so does not significantly alter the results. The opposition could be formalized as imposing direct costs on the government. In this case, the regime's payoff would be reduced, but the government would still choose to employ repression to counter the group's activities. Thus, I choose the more parsimonious model presented here.

Further, I do not explicitly model backlash against the government, where some citizens become more likely to support the opposition in response to repression, for two reasons. First, since the citizens choose whether to work or join the opposition after the government chooses its levels of repression, backlash by some citizens is entirely captured by the model as is. While I do not characterize shifts in citizens' ideological preferences after the government's choice, such a response by some individuals is feasible, if implicit, within my framework.

Second, incorporating ideology in the model as fixed parameters, instead of viewing ideology as a function of repression, is akin to controlling for ideology in an empirical model. That is, my question regards the effect of state repression on civilian responses, for a fixed ideological distribution. Accounting for backlash would require endogenizing ideology in the model, requiring at minimum interacting ideology with repression, and changing the interpretation of the effects of both ideology and repression on citizens' choices. For a model that explicitly addresses endogenous backlash against government violence see Gibilisco (2018).

Lastly, this model's aim is to offer an explanation of an observed phenomenon—the incidence of mass repression and its frequent use in conjunction with targeted repression—not offer a prescriptive theory for countering opposition groups. The mechanisms identified, which operate through participation and material wellbeing incentives, may differ from the rationales for such repression offered by regimes themselves for two reasons. Fist, repressive governments are likely to offer explanations for mass repression that are more sympathetic to the regime. Second, a leader's decision to employ mass repression may depend on a number of other concerns that are outside the scope of this model, including characteristics of the security forces, the influence of allies, and the trajectory of the conflict. Because the channels identified in the model change opposition group participation in a manner that is favorable for the government, regimes may, implicitly or explicitly, take them into account when choosing targets of repression.

## Citizen's Tradeoff

In my framework, economic incentives shape citizens' choices in the context of government repression, and the state manipulates such incentives. I consider in turn the citizen's decision of whether to join the opposition or supply labor to the economy, and the government's policy

of repression. The citizens make their choice last, and thus, proceeding backwards, I consider their response to repression first.

The impact of government repression on an individual citizen depends on whether she joins the opposition or participates in the economy. Joining the opposition carries the risk of targeted repression. More importantly, because targeted repression is perfectly discriminating, it asymmetrically increases the risk of victimization—only individuals who choose to support the opposition face the risk of targeted repression. The potential of being the victim of targeted repression reduces the ideological benefit of joining the opposition group, making economic participation more appealing. Citizens face the risk of mass repression whether or not they choose to participate in the opposition group. Because mass repression targets both opposition members and non-members alike, the additional risk of victimization for an individual citizen is equal regardless of which side she chooses to support. In fact, the citizen's choice can be reduced such that the effect of mass repression drops out of the calculus.

The population's response to the regime's repressive efforts is represented by the marginal citizen who is indifferent between supporting the regime and joining the opposition group. The threshold above which citizens join the opposition group and below which they participate in the economy is represented by the marginal ideological type $\theta^*$ that solves (1). This marginal individual characterizes the equilibrium labor force participation rate, which endogenously generates the wage offered to individuals participating in the economy.

Rearranging (1), the marginal type is $\theta^* = \frac{u(c(t,m))}{(1-t)}$. The unique labor force participation rate, then, is given by the proportion of citizens whose ideological preference for the opposition is equivalent to or less than this threshold. Given that ideological types are distributed uniformly over $[\underline{\theta}, \bar{\theta}]$, the labor force participation rate solves

$$\lambda^* = \frac{\frac{u(Y'(L(t,m)))}{(1-t)} - \underline{\theta}}{\bar{\theta} - \underline{\theta}}. \tag{3}$$

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The citizens' optimal choice can be characterized by the more interpretable labor force participation rate.

**Lemma 2** *For fixed levels of repression, t and m, the marginal citizen $\theta^*$ is characterized by a unique $\lambda^*(t, m)$, the equilibrium labor force participation rate.*

The regime will implement a policy of repression only if doing so can increase labor force participation. I restrict attention to this case for the remainder of the analysis.

## Economic Motives for Repression

Proceeding to the government's repression strategy, the regime chooses levels of targeted and mass repression to maximize economic output. The regime's repression decision solves an optimization problem that accounts for the expected response of the citizenry. The government's problem depends indirectly on the citizens' choice through the labor force participation rate, $\lambda^*$. The regime chooses repression to maximize,

$$\max_{t,m} \ Y((1-m)\lambda^*(t,m)) - k(t). \tag{4}$$

Before analyzing the equilibrium levels of targeted and mass repression, it helpful to note that to receive positive utility, the government must ensure some citizens participate in the labor market. Thus, a predatory policy of repression without concern for cost is not optimal within this framework. The regime has no incentive to repress its entire population.

**Lemma 3** *The government will never choose $m = 1$. For sufficiently high costs, the government will never choose $t = 1$.*

Moreover, the government's problem does not immediately suggest the regime will prefer to use positive levels of either targeted or mass repression. Both types of repression are costly. Targeted repression carries an explicit cost $k(\cdot)$. Mass repression generates indirect costs by reducing the size of the potential labor pool, creating a ceiling for the regime's utility. Positive levels of repression are only optimal for the regime if their effect on labor force participation exceeds their costs. The optimal levels of targeted and mass repression solve

$$Y'((1-m)\lambda^*)((1-m)\lambda_t^*) - k = 0,$$

$$Y'((1-m)\lambda^*)((1-m)\lambda_m^* - \lambda^*) = 0. \tag{5}$$

The amounts of targeted and mass repression employed by the state depend on the equilibrium wage, the direct and indirect effects of employing each type of repression on the labor force participation rate, and the cost of targeted repression.

The government's utility is increasing in both targeted and mass repression, for sufficiently low $k$, thus the regime will prefer to choose levels of $t$ and $m$ above zero. The government's best response to the citizens' choice is an optimum with $t^*, m^* \in (0,1)$, which are implicitly defined by the first order conditions. In equilibrium, the regime will employ positive levels of both targeted and mass repression.

**Proposition 1** *There exists a subgame perfect Nash equilibrium characterized by $(\lambda^*, t^*, m^*)$ where $\lambda^*$ represents the unique labor force participation rate and the regime employs both targeted and mass repression such that $t^*$ and $m^*$ solve*

$$\underbrace{\frac{Y'((1-m)\lambda^*)}{Y''((1-m)\lambda^*)}}_{\substack{\text{responsiveness of} \\ \text{wages to repression}}} = -\underbrace{\frac{u'(Y'((1-m)\lambda^*))}{u(Y'((1-m)\lambda^*))}}_{\substack{\text{responsiveness of} \\ \text{citizen's utility} \\ \text{to repression}}} \cdot \underbrace{(1-t)}_{\substack{\text{magnitude} \\ \text{of security} \\ \text{concern}}} \cdot \underbrace{k}_{\substack{\text{cost of targeted} \\ \text{repression}}}$$

The regime's targeted and mass repression strategy is chosen to balance the elasticity of wages against the elasticity of the citizens' utility, the degree of risk from targeted repression incurred by opposition members, and the cost of carrying out targeted repression.

A novel implication of this equilibrium is that choosing positive levels of mass repression is optimal for the government. Conventional wisdom suggests that mass repression is either an accident or a mistake, and regimes should not choose to employ mass repression when they are able to repress in a targeted manner. The optimality of mass repression in my framework is due to repression's effect on citizens, whose choice is influenced by the equilibrium wage offered in the economy. By fixing the wage, I both recover the conventional wisdom and demonstrate what is lost in failing to account for citizen's response to government repression.

**Remark 1** *For a fixed wage, the government may employ targeted repression, $t^* \geq 0$, but will not utilize mass repression, i.e. $m^* = 0$.*

As is true for other theories of repression tactics, targeted repression is an optimal choice (given it is not too costly) regardless of how repression affects citizens' material incentives. Targeted repression has no direct effect on the economy, and therefore is a worthwhile choice for the regime even when wages are fixed. Mass repression, however, is not optimal given fixed wages. In this case, observing mass repression would suggest either the regime had erred or has adopted a strategy of last resort—as predicted by existing theoretical accounts. What my framework makes clear is that this explanation of mass repression hides an assumption that repression does not affect material incentives for citizens. When the labor force participation rate changes with repression, mass repression is a part of the government's optimal strategy. In fact, a strategy that employs both targeted and mass repression is optimal because each tactic has a distinct effect on the citizens' choice of whether to join the opposition.

## Participation and Material Wellbeing Incentives

Targeted and mass repression have different effects on the citizen's participation decision, and thus operate through separate channels. To isolate the effect of each type of repression on citizens' incentives, I consider the regime's use of each type of repression independently. Assessing how the citizens' choice responds to changes in the government's repression strategy serves to distinguish the mechanisms by which each type of repression impacts their incentives. Formally, these mechanisms are given by the effect of $t$ and $m$ on the labor force participation rate. These results can be considered intermediate comparative statics of the citizens' subgame since, in the limited context of the citizens' choice, the levels of targeted and mass repression are exogenous. I refer to the labor force participation rate as $\lambda^\dagger$ to distinguish it from the labor force participation in equilibrium.

Targeted repression encourages participation in the economy. Because targeted repression only impacts individuals who join the opposition, increasing $t$ subsequently increases the risk associated with opposition membership. In this way, targeted repression triggers an individual's security concern. Further, targeted repression reduces the benefit of challenging the regime relative to supplying labor. Participation in the economy does not carry the risk of targeted repression. Thus, for some individuals, the increased risk of targeted repression reduces their expected ideological benefits enough that they will instead prefer participating in the economy. This will induce a shift in the labor force participation rate.

**Remark 2** *Labor force participation is increasing in the level of targeted repression.*

By reducing the payoff of opposition group participation, targeted repression increases $\theta^\dagger$ such that fewer citizens support the opposition and more supply labor to the economy. The *participation incentive* generated by targeted repression leads to an increase in the size of the labor force.

However, targeted repression also has a countervailing effect. As more citizens prefer to work, the benefits of economic participation will decrease. For some proportion of the citizens, the value of material benefits offered in an economy flooded with labor will not be enough to exceed their ideological benefit from opposition membership, regardless of the increased repression risk. This renders the effect of targeted repression moot for these individuals. Thus, in isolation, the participation incentive reduces opposition group membership, but also generates a negative strategic feedback that fails to maximize the size of the potential labor pool. Targeted repression alone is insufficient to cause all citizens who are near indifferent between working and joining the opposition to sort back into the labor market.

Because mass repression targets both civilians and opposition members, it has no direct effect on labor force participation—the expected payoff for any individual reduces to the same tradeoff she would make in the absence of repression. However, mass repression has an indirect effect on the citizen's tradeoff, through its effect on economic opportunity. Mass repression alters the utility of economic participation.

**Remark 3** *Labor force participation is increasing in the level of mass repression.*

Mass repression does have a negative direct effect on the labor market—it reduces the overall population of potential laborers. However, because the wage is endogenously determined, when the potential labor pool is reduced by mass repression, wages increase. This triggers the citizens' material wellbeing concern. As mass repression makes labor scarcer, the utility of economic participation increases and citizens whose ideological benefit from opposition participation is relatively low will prefer to supply labor instead. Mass repression induces a shift in the marginal type $\theta^{\dagger}$ such that citizens will sort into the labor market that otherwise would have joined the opposition.

The indirect effect of mass repression dominates the direct effect such that overall, labor force participation increases with mass repression. Key in this case is that mass repression

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achieves an increase in labor supply without directly incentivizing economic participation. The *material wellbeing incentive* is sufficiently powerful to make additional citizens prefer joining the labor market to joining the opposition group.

The participation and material wellbeing incentives enable the government to use repression to manipulate the labor market. By selecting levels of targeted and mass repression that induce the type of sorting generated by these mechanisms, the government both increases its own economic output and incidentally reduces the size of the opposition group.

# Repression Reinforces Repression

While it is notable that both targeted and mass repression are optimal for the government, what remains unclear is whether one repression tactic is preferred to the other. Much of the literature indicates that mass repression is less desirable than targeted repression (Mason and Krane, 1989; Kalyvas, 1999; Arreguín-Toft, 2001; Kocher, Pepinsky and Kalyvas, 2011). Thus, when targeted repression is feasible, which implies its costs are low, governments should substitute targeted for mass repression. Others have argued mass repression can, in some cases, hamper an opposition group to the benefit of the regime, so this predicted substitution should be at most incomplete (Lyall, 2009; Zhukov, 2015). Further, targeted and mass repression may even be complementary, meaning the regime prefers to use more of both types of repression simultaneously.

The relationship between targeted and mass repression depends on two factors: the cost of targeted repression and the relationship between the effects of targeted repression and mass repression on the labor force participation rate. Within my framework, targeted and mass repression are sometimes complements, and sometimes substitutes for the government. There are ranges of the parameter space where the regime substitutes targeted repression

for mass repression, substitutes mass repression for targeted repression, and employs higher levels of both types of repression concurrently.

In contrast with much of the literature on mass repression, as the cost of targeted repression decreases—circumstances under which governments are naturally expected to employ more targeted repression—the most effective strategy may be to increase levels of both targeted and mass repression. Within this region of complementarity, targeted and mass repression's joint effect on the economy incentivizes the government to employ more of both types of repression.

**Proposition 2** *When targeted and mass repression have reinforcing effects on labor force participation* $(\lambda^*_{mt} > 0)$, *if the cost of targeted repression is low, then targeted and mass repression are complements.*

Complementarity of targeted and mass repression arises as a result of the complex effect of mass repression on labor force participation. A necessary condition for complementarity is that the marginal effect of targeted repression on labor force participation is increasing in the level of mass repression (or vice versa). In other words, more citizens are willing to participate in the economy due to the risk of targeted repression—the participation incentive is stronger—when the level of mass repression is higher. This can also be thought of as the interaction effect of targeted and mass repression on labor force participation. When this interaction effect is positive, targeted repression's sorting effect is reinforced by mass repression. In this case, the government is willing to accept the costs of each type of repression in exchange for increased benefits derived from employing higher levels of both.

Understanding when, and why, targeted and mass repression are complements can in part explain the shift in tactics of the Indonesian government from its 1990-1998 campaign against the Free Aceh Movement (GAM) and a subsequent counterinsurgency effort in 2001-2004. In the first campaign, known as the 'Military Operation Area' (DOM) period, the Indonesian

military struggled to identify members of GAM, incurring high costs for targeted repression. Instead, the regime acted without restraint, relying on collective punishment and perpetrating a number of abuses. Though the security forces had largely eliminated GAM's military capacity by 1992, the counterinsurgency continued until 1998, affecting mainly civilians (Sukma, 2004). The DOM period nearly eliminated GAM but not the Acehneses' calls for independence (Aspinall, 2009, 112).

After the fall of Suharto, motivated in part by the precise material wellbeing incentives, predicted by the model, GAM reorganized, attaining peak strength around 2000.[12] The regime responded, though this time adopting an explicit 'hearts and minds' counterinsurgency approach (Sukma, 2004). Military operations in 2001 were largely targeted, directed against GAM headquarters and other strongholds (Human Rights Watch, 2003). When a ceasefire broke down in 2003, the regime adopted a strategy that involved both targeted and mass repression (Czaika and Kis-Katos, 2009). The government continued to make some effort to distinguish between insurgents and non-GAM members by instituting a new ID card system, which required a background check designed to identify GAM members (International Crisis Group, 2003). However, government forces also perpetrated extra-judicial killings during operations that cleared villages in the name of punishing GAM members (Human Rights Watch, 2003). Further, the displacement, sometimes forced, of tens of thousands of non-combatants represents a clear adoption of mass repression tactics.

What changed in Aceh between the DOM period and the early 2000s campaign? The model suggests that complementarity arises when the cost of targeted repression is sufficiently low and targeted and mass repression have reinforcing effects on labor force participation, incentivizing the combination of targeted and mass repression tactics by the Indonesian

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[12]Liquid natural gas extraction in Aceh expanded rapidly through the 1980s, and exploitation of Aceh's natural resources by government affiliated actors expanded in the DOM period. Migrants seeking employment triggered land seizure and job competition with the local Acehnese, which was linked to increased support for GAM (Hiorth, 1986; Kell, 2010).

regime. There is evidence that the cost of targeted repression was reduced relative to the DOM period.[13] In addition to ID cards, improvements in the military's intelligence decreased the cost of targeting GAM members (Aspinall, 2009, 251).[14] The effects of targeted and mass repression on the labor force participation rate is more difficult to observe. Patterns of migration suggest that those individuals who left conflict-affected regions moved to wealthier, more urban coastal areas in Aceh, where presumably they pursued some means of attaining material benefits. The effect of conflict on migration compounded traditional migration incentives, like economic opportunity (Czaika and Kis-Katos, 2009). Moreover, during the counterinsurgency campaign, GAM leaders, businesspeople, and local government officials who has been involved with GAM defected to the government (Aspinall, 2009, 181). This evidence is suggestive of a reinforcing effect between targeted and mass repression on the labor force participation rate.

## Substituting Targeted and Mass Repression

In line with expectations from previous studies, targeted and mass repression may also be substitutes for the regime, depending again on the cost of targeted repression and repression's economic repercussions. Substitutability of targeted and mass repression implies the marginal benefit to the regime of increasing the amount of mass repression is decreasing in the level of targeted repression, or vice versa. Because the optimal level of targeted repression increases as its costs are reduced, substitution establishes the government will trade targeted repression for mass repression. If the cost of targeted repression is sufficiently high, regardless of the

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[13]This assessment is based on the types of features identified in the literature as linked with high costs for targeted repression, namely limited military or intelligence capabilities.

[14]Perhaps more convincing, the Indonesian security forces sometimes collaborated with GAM, for financial and security gains, suggesting GAM's membership was clearly identifiable (Aspinall, 2009, 188-189).

labor market effects of repression, the government will substitute mass repression for targeted repression.

**Proposition 3** *Targeted and mass repression are substitutes for the regime when:*

1. *mass repression decelerates the effect of targeted repression on labor force participation ($\lambda_{tm}^* < 0$), and the cost of targeted repression is low. The government substitutes targeted for mass repression.*

2. *the cost of targeted repression is high. The government substitutes mass for targeted repression.*

The regime will substitute targeted for mass repression when the cost of targeted repression is low and mass repression dampens the effect of targeted repression on labor force participation. Under these circumstances, we should observe governments pursuing highly discriminating repression strategies like jailing individual dissidents. Or in the case of Bahrain, revoking the citizenship of journalists, activists, and opposition members.

Bahrain's practice of citizenship-stripping represents a clear example of substituting targeted for mass repression. In 2013, in the aftermath of protests against the Bahraini monarchy, the government amended its anti-terror legislation to permit revocation of citizenship as a punishment for those accused of terrorism, or intent to commit terrorist acts, against the state (Babar, 2017). In the five-year period between 2012 and 2017, the regime revoked the citizenship of around 450 individuals, mostly from the disempowered Shia majority, targeting "dissidents the authorities no longer regarded as members of the political community" (Alsabeehg, 2018, 135). Individuals who have lost their citizenship include activists, journalists, and religious scholars (Human Rights Watch, 2018). Human rights groups claim this forced stateless is deliberate repression of legitimate dissent.

Setting aside the Bahraini government's justification for citizenship revocation, this example validates the predictions of the model. The Bahraini security forces are sufficiently competent to capture and detain dissidents, therefore the expected cost of targeted repression is low. This suggests Bahrain may benefit from substituting targeted for mass repression. The model predicts substitution of targeted for mass repression when mass repression decelerates the effect of targeted repression on labor force participation. In other words, if increasing the level of mass repression would dull the effects of the participation incentive, the regime is more likely to employ targeted repression instead of mass repression. While we cannot observe the hypothetical Bahraini opposition response to mass repression in addition to the citizenship revocations, some experts suggest morale is waning among opposition supporters in the wake of targeted government repression (Kerr, 2016). Moreover, a brutal crackdown against protests in 2011—a clear example of mass repression—failed to eliminate the Bahraini opposition (McEvers, 2012). Thus, the Bahraini case exemplifies when substituting targeted for mass repression produces the government's desired effects.

When the cost of targeted repression is prohibitively high for the regime, the model recovers a result from the literature on indiscriminate violence. This literature contends states use mass repression because they are incapable of pursuing more discriminating tactics. However, the model makes clear that substitution of mass repression for targeted repression occurs for a different reason. For the regime, targeted and mass repression are substitutes not simply because targeted repression is more expensive. The tradeoff is subtler. Both types of repression achieve similar objectives for the government—both reduce the opposition threat by encouraging participation in the labor force. While mass repression affects citizens' material wellbeing concerns rather than their security concerns, it is sufficient to prompt some citizens to sort into the labor force. Thus, when targeted repression is too expensive for the regime, it is willing to shift to using mass repression instead. In this way, the regime achieves the same outcome, through a distinct channel, with lower costs. It is not necessarily

the case that governments substituting mass repression for targeted repression will use no targeted repression. But, when the cost of targeted repression is sufficiently high, regimes capable of implementing targeted repression will trade some targeted repression for mass repression.

# Conclusion

Regimes that respond to threats from opposition groups with repression must make a strategic choice about which individuals or groups to target with repressive force. Governments that choose targeted repression direct their coercive force against only those individuals who have opted to participate in an opposition group. In addition to, or instead of, targeted repression, regimes may employ mass repression that targets members of the opposition and non-members indiscriminately. All repression tactics manipulate civilians' tradeoff between material wellbeing and an ideological inclination toward the opposition. Both targeted and mass repression affect citizens' willingness to participate in an opposition group, but operate through distinct channels. Targeted repression, because it only effects members of the opposition, triggers a security concern that prompts citizens to sort out of the opposition and into the labor force. Thus, targeted repression generates a participation incentive. Mass repression creates sufficient economic incentives to accommodate this shift in participation, and ensures the benefits of economic participation are sufficiently high to deter citizens from joining the opposition. Consequently, mass repression produces a material wellbeing incentive.

My framework shows that targeted and mass repression employed in concert comprise an optimal strategy for regimes countering opposition groups. Because repression manipulates the opportunity cost of supporting the opposition, through the participation and material wellbeing incentives, governments will employ both targeted and mass repression. In these

ways, repression provides dual benefits for the regime of weakening the opposition group and improving economic opportunities. These participation and material wellbeing mechanisms provide a novel rationale for mass repression, and the joint usage of targeted and mass repression. Mass repression is not merely the result of weak intelligence gathering or low state capacity. Moreover, for the government these two types of repression are, in some cases, complements. Regimes able to afford more targeted repression will also employ more mass repression. Departing from existing literature, my model shows that when the cost of targeted repression is low—when other scholars would expect no mass repression—the economic mechanism I identify instead generates complementarities between targeted and mass repression. However, under some circumstances, governments will prefer to substitute targeted for mass repression, or vice versa. Mass repression is a less costly substitute for particularly low capacity states, while targeted repression is desirable for more capable regimes when repression's effects on citizens' incentives are not reinforcing.

My model's predictions of the conditions under which targeted and mass repression complement, or substitute for, each other provide clear, and testable, explanations for observed patterns of repression. Further, the endogenous interaction between state policies of repression and economic opportunity indicators, like wages, suggest scholars should be cautions when incorporating proxies for material wellbeing in regressions explaining repression. My theory indicates empirically estimating the opportunity cost of conflict leveraging exogenous shocks to material wellbeing incentives will provide more consistent estimates of the effects of variation in opportunity cost of opposition membership.

# Appendix A

**Proof of Lemma 1:**

Recall each citizen that chooses to participate in the economy earns a wage and consumes goods subject to the budget $w \geq c \cdot p$. An individual citizen's expected utility from supplying labor is $(1 - m)u(c)$. Since the budget will be satisfied for all citizens in equilibrium, the individual's expected utility, given participation in the economy, can be rewritten as $(1 - m)u\left(\frac{w}{p}\right)$. All citizens for whom $(1 - m)u\left(\frac{w}{p}\right) \geq (1 - m)(1 - t)\theta_i$ join the labor force. The labor force participation rate is given by $\lambda$. Labor supply, then, is $L = (1 - m)\lambda$.

The firm is profit maximizing, where profits are given by $pY(L) - w \cdot L$ where $p$ is the price of the good $y$ produced by the firm, and $Y(\cdot)$ is the production technology. The firm then solves

$$\max_{L} \quad pY(L) - w \cdot L.$$

The first order condition is

$$pY'(L) = w.$$

Posit an $L^{\dagger}$, which is the labor supply that solves the firm's problem. For a given wage $w$ and optimally chosen labor supply $L^{\dagger}$, the firm's profit is

$$\pi(w) = p \cdot Y(L^{\dagger}(w)) - w \cdot L^{\dagger}.$$

For the labor market to clear, the labor supplied by the citizens must equal the labor demanded by the firm in equilibrium. Formally, labor market clearing requires $(1 - m)\lambda^* = L^{\dagger}$. For this to hold, there must exist a wage $w^*$ such that labor supply equals labor demand, given that citizens are choosing optimally whether or not to supply labor and the firm is maximizing profits.

Labor market clearing requires the threshold strategy that determines citizens' participation decision and the first order condition for the firm hold simultaneously. Using the firm's FOC and substituting for the wage in the citizen's strategy yields

$$(1 - m)u\Big(\frac{pY'(L)}{p}\Big) \geq (1 - m)(1 - t)\theta_i.$$

Of interest is the unknown $L$ in this expression. The $L$ that solves this equation is the competitive equilibrium level of employment, which I will refer to as $L^* = (1 - m)\lambda^*$. Given equilibrium employment, it is straightforward to determine equilibrium wages and consumption. Returning to the firm's FOC, the wage in equilibrium is $w^* = pY'((1 - m)\lambda^*)$. Consumption is $c^* = \frac{pY'((1-m)\lambda^*)}{p}$. The last condition on consumption ensures household consumption equals the output from production. Optimal consumption, labor market clearing, and the satisfaction of the household budget constraint imply the goods market clears.

This price is treated as the numeraire for the remainder of the analysis, thus $p$ is normalized to 1. ∎

**Proof of Lemma 2:** First, assume a fixed $t$ and $m$. This allows for focus on the relationship between $\theta$ and $\lambda$ while bracketing out their mutual dependency on repression.

Consider the individual citizen's tradeoff $(1 - m)u(c) \lessgtr (1 - m)(1 - t)\theta_i$. She will choose to join the opposition if the left-hand side is smaller than the right-hand side. This reduces to the comparison

$$u(Y'(L)) \lessgtr (1 - t)\theta_i,$$

substituting for consumption as in Lemma 1. The marginal citizen that is indifferent between joining the opposition or participating in the economy is the citizen for which this equation is satisfied with equality.

Rearranging the payoff comparison for the marginal type

$$\theta^* = \frac{u(Y'(L))}{(1-t),}$$

gives a threshold in the ideological space above which all individuals will join the opposition. Since ideology is distributed uniform from $[\underline{\theta}, \overline{\theta}]$, the labor force participation rate (i.e. the proportion of citizens who opt to participate in the economy) is derived from the CDF of the continuous uniform distribution.

$$\lambda^* = \begin{cases} 0 & \text{if } \theta^* < \underline{\theta} \\ \frac{\frac{u(Y'(L(t,m)))}{(1-t)} - \underline{\theta}}{\overline{\theta} - \underline{\theta}} & \text{if } \theta^* \in [\underline{\theta}, \overline{\theta}) \\ 1 & \text{if } \theta^* \geq \overline{\theta}. \end{cases}$$

Thus $\lambda^*$ is uniquely determined by $\theta^*$, and $\lambda^*$ can be used to characterize the equilibrium labor force participation threshold strategy for the citizens. ∎

**Proof of Lemma 3:** For mass repression, $m = 1$ cannot solve the first order condition as the left-hand side would equal infinity. For targeted repression $t = 1$, the optimal labor force participation rate $\lambda^*$ is undefined. Moreover, as $t^*$ approaches 1, the direct cost of targeted repression restrains the regime such that the benefits of repression can never compensate if $k$ is sufficiently high, i.e. $k > Y((1-m)\lambda^*)$. ∎

**Proof of Proposition 1:**

Uniqueness of $\lambda^*$ follows from Lemma 2. By construction, the choice of $t$ and $m$ that solve the government's optimization problem are sequentially rational. Thus any solution to the government's problem, given $\lambda^*$, characterizes an equilibrium.

The regime's problem is

$$\max_{t \in [0,1], m \in [0,1]} Y((1-m)\lambda^*) - k(t).$$

Since the production function is continuous in $t$ and $m$ and $[0,1]$ is compact, a solution exists by the Extreme Value Theorem.

The solution is characterized by the first order conditions

$$Y'((1-m)\lambda^*)((1-m)\lambda_t^*) - k = 0$$

$$(6)$$

$$Y'((1-m)\lambda^*)((1-m)\lambda_m^* - \lambda^*) = 0.$$

To characterize the equilibrium in a more substantively interesting way, first solve the first order condition for $m$ for $(1-m)$,

$$(1-m) = \frac{\lambda^*}{\lambda_m^*}.$$

Then, this value can be substituted into the first order condition for $t$,

$$Y'((1-m)\lambda^*)((1-m)\lambda_t^*) = k$$

$$(1-m)\lambda_t^* = \frac{k}{Y'((1-m)\lambda^*)}$$

$$\frac{\lambda^* \lambda_t^*}{\lambda_m^*} = \frac{k}{Y'((1-m)\lambda^*)}.$$

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Simplifying the left hand side and rearranging yields

$$\underbrace{\frac{Y'((1-m)\lambda^*)}{Y''((1-m)\lambda^*)}}_{\substack{\text{responsiveness of} \\ \text{wages to repression}}} = -\underbrace{\frac{u'(Y'((1-m)\lambda^*))}{u(Y'((1-m)\lambda^*))}}_{\substack{\text{responsiveness of} \\ \text{citizen's utility} \\ \text{to repression}}} \cdot \underbrace{(1-t)}_{\substack{\text{magnitude} \\ \text{of security} \\ \text{concern}}} \cdot \underbrace{k}_{\substack{\text{cost of targeted} \\ \text{repression}}}$$

To show an interior solution $(t^*, m^*)$ exists, notice Lemma 3 rules out the corner solutions $(1,1)$, $(t^*,1)$, and $(1,m^*)$ for sufficiently high $k$. Next, consider the case where the government employs neither type of repression, i.e. $(t^*, m^*) = (0,0)$. Let $\lambda_0^* = u(Y'(\lambda^*))$ be the optimal labor force participation rate for $(t,m) = (0,0)$, normalizing $[\bar{\theta}, \underline{\theta}]$ to $[0,1]$ for clarity of exposition. An interior requires that there exists some $\epsilon_t > 0, \epsilon_m > 0$ such that the government receives higher utility from choosing $(t^*, m^*) = (\epsilon_t, \epsilon_m)$ than $(0,0)$.

Considering $\epsilon_m$ first, an interior solution implies $Y((1-\epsilon_m)\lambda^*) > Y(\lambda_0^*)$, holding $t = 0$ fixed temporarily. Since $Y(\cdot)$ is increasing in $L = (1-m)\lambda^*$, the relevant comparison is $(1-\epsilon_m)\lambda^* > \lambda_0^*$, which holds if the effect of a small increase in mass repression generates an increase in labor force participation greater than the proportion of the labor pool it eliminates. This comparison is $\frac{\partial Y}{\partial m} < \frac{\partial Y}{\partial \lambda^*}$, which is

$$Y'((1-m)\lambda^*)((1-m)\lambda_m^* - \lambda^*) < Y'((1-m)\lambda^*)(1-m),$$

which holds when

$$(1-m)\lambda_m^* - \lambda^* < (1-m).$$

At equilibrium, $\lambda^* = (1-m)\lambda_m^*$. Substituting for $(1-m)$ on the left hand side, $(1-m)\lambda_m^* - (1-m)\lambda_m^* = 0 < 1 - m$, establishing $(1-\epsilon_m)\lambda^* > \lambda_0^*$. In addition, $\epsilon_t > 0$, is optimal when $Y((1-\epsilon_m)\lambda^*) - k\epsilon_t > Y((1-\epsilon_m)\lambda^*)$. This holds for sufficiently small $k$ such that $\frac{\partial Y}{\partial t} > 0$.

■

**Proof of Remark 1:** The government's repression decision absent the material incentive mechanisms can be thought of as assessing the effect of $t$ and $m$ for a fixed wage that does not depend on repression.

The government's problem is to maximize output

$$\max_{t,m} Y((1-m)\lambda) - k(t),$$

where $Y(\cdot)$ represents the production function. The regime's chosen repression levels, $t^\dagger$ and $m^\dagger$, represent a strategy for the government's sub-game (and are thus not equilibrium strategies). Let the fixed wage be $\hat{Y} = Y'((1-m)\lambda^*)$ where $\lambda^*$ does not depend on $t$ or $m$. The government solves:

$$\hat{Y} \cdot (1-m)\lambda_t^* - k = 0,$$

$$\hat{Y} \cdot \left((1-m)\lambda_m^* - \lambda^*\right) = 0.$$

While wages are fixed, the citizens' security concern arising from targeted repression remains. Therefore, by generating a cost for participation in the opposition group, targeted repression still has a positive effect on the labor force participation rate, i.e. $\lambda_t^* > 0$. The government's choice $t^\dagger \geq 0$ solves the first order condition for targeted repression.

However, since mass repression's effect operates through the wage, the marginal effect of mass repression on labor force participation when wages are fixed is zero, meaning $\lambda_m^* = 0$. However, the direct effect of mass repression on the labor force persists. Mass repression removes some citizens from the labor supply but not all citizens, i.e. $\lambda^* > 0$. Thus, mass repression, in this case, only has a direct effect of reducing the labor pool. Therefore, the

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government will always choose $m^\dagger = 0$. Mass repression arises exclusively through its effect on the labor market. ∎

**Proof of Remark 2:**

Implicitly differentiating $\lambda^\dagger$,

$$\frac{d\lambda^\dagger}{dt} = -\frac{\frac{1}{\overline{\theta}-\underline{\theta}}\left(\frac{u(Y'(L))}{(1-t)^2}\right)}{\frac{1}{\overline{\theta}-\underline{\theta}}\left(\frac{u'(Y'(L))Y''(L)(1-m)}{1-t}\right) - 1} > 0 \tag{7}$$

∎

**Proof of Remark 3:**

Implicitly differentiating $\lambda^\dagger$,

$$\frac{d\lambda^\dagger}{dm} = -\frac{\frac{1}{\overline{\theta}-\underline{\theta}}\left(\frac{u'(Y'(L))Y''(L)(-\lambda^*)}{1-t}\right)}{\frac{1}{\overline{\theta}-\underline{\theta}}\left(\frac{u'(Y'(L))Y''(L)(1-m)}{1-t}\right) - 1} > 0 \tag{8}$$

∎

**Proof of Proposition 2:**

To determine gross complementarity and substitutability, of interest is $\frac{dm}{dk}$, the relationship between the cost of targeted repression and the level of mass repression. By the chain rule, this is

$$\frac{dm^*}{dk} = \frac{dm^*}{dt^*}\left(\frac{dt^*}{dk}\right).$$

Since $t^*$ is characterized by the first order condition for the regime with respect to $t^*$, by the implicit function theorem,

$$\frac{dt^*}{dk} = -\frac{-1}{Y''((1-m)\lambda^*)((1-m)\lambda_t^*)^2 + Y'((1-m)\lambda^*)(1-m)\lambda_{tt}^*},$$

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which is negative when $\lambda_{tt}^* < 0$.

Taking $\lambda_t^*$ from the first order condition, and taking its derivative with respect to $t$, gives:

$$\frac{\partial^2 \lambda^*}{\partial t^2} = \frac{k \cdot Y''((1-m)\lambda^*)(1-m)^2 \lambda_t^*}{Y'((1-m)\lambda^*)(1-m)} < 0.$$

Since the first order conditions for the government also characterize $m^*$, $\frac{dm^*}{dt^*}$ is equivalent to $\frac{\partial^2}{\partial m \partial t} Y(L(t,m))$ where $Y(\cdot)$ represents the regimes problem. The cross-partial of the regime's objective function thus signs the relationship between targeted and mass repression.

$$\frac{\partial^2 Y}{\partial m \partial t} = Y''((1-m)\lambda^*)((1-m)\lambda_t^*)((1-m)\lambda_m^* - \lambda^*) + Y'((1-m)\lambda^*)((1-m)\lambda_{mt}^* - \lambda_t^*). \quad (9)$$

Observe from the first order conditions that, in equilibrium, $\lambda_m^* = \frac{\lambda^*}{1-m}$. This implies the first term of 9 is 0. Complementarity then requires

$$Y'((1-m)\lambda^*)((1-m)\lambda_{mt}^* - \lambda_t^*) > 0.$$

$\lambda_m^*$ can be rewritten as

$$\lambda_m^* = \frac{1}{\overline{\theta} - \underline{\theta}} \left( \frac{u(Y'((1-m)\lambda^*)) - \underline{\theta}}{(1-t)(1-m)}. \right)$$

The derivative with respect to $t$ is

$$\lambda_{mt}^* = \frac{(1-t)(1-m)u'(Y'(L))Y''(L)(1-m)\lambda_t^* - u(Y'((1-m)\lambda^* L)) - \underline{\theta} \cdot (-(1-m))}{\left((1-t)(1-m)\right)^2}.$$

The numerator is positive when

$$(1-t)(1-m)\frac{u'(Y'(L))}{u(Y'(L))}Y''(L)\lambda_t^* > -1. \tag{10}$$

Having established the conditions under which $\lambda_{mt}^*$ is positive (or negative), the cross-partial of the government's objective can be re-expressed as

$$Y'((1-m)\lambda^*)((1-m)\lambda_{mt}^* - \lambda_t^*) > 0. \Rightarrow (1-m)\lambda_{mt}^* > \lambda_t^*. \tag{11}$$

From the first order condition,

$$\lambda_t^* = \frac{k}{Y'(L)(1-m)}.$$

Substituting this into 11, targeted and mass repression are complements for the government when

$$Y'((1-m)\lambda^*)(1-m)^2\lambda_{mt}^* > k, \tag{12}$$

and substitutes otherwise. If $\lambda_{mt}^* < 0$, targeted and mass repression are always substitutes. When $\lambda_{mt}^* > 0$ and $k$ is small, targeted and mass repression are complements. ∎

**Proof of Proposition 3:** The proof follows immediately from the proof of Proposition 2. The proposition holds when $\frac{dm}{dk} > 0$. ∎

# Appendix B: Functional Forms

To make the equilibrium and comparative static results more concrete, in this appendix I choose explicit functional forms for the production function and the citizen's utility. This serves to illustrate the reasonableness of the strict concavity assumptions in the main model and demonstrate the model's consistency with common assumptions about production technologies. Since the distribution of ideology does not change relative to the main model, I make the normalization $[\underline{\theta}, \overline{\theta}] = [0, 1]$ for clarity and ease of reading.

For this appendix, I assume that the production function is Cobb-Douglas, taking the form $Y = L^{\frac{1}{2}} = ((1-m)\lambda^*)^{\frac{1}{2}}$. The citizen's utility function is $u(c) = \frac{c^{1/2}}{\frac{1}{2}}$.[15] The optimal labor force participation rate, then, is

$$\lambda'^*(m,t) = \frac{\sqrt{2}((1-m)\lambda^*)^{-1/4}}{1-t}.$$

Before proceeding, it is worth noting that $\lambda'^*(m,t)$ is a partial differential equation, the solution of which depends on the choice of functional forms. Changing the functional form for either production technology or the citizens' utility changes the solution to this PDE.

Having pinned down the citizen's choice under these assumptions, we prodceed to the government's choice of targeted and mass repression. The regime's problem is

$$\max_{t\in[0,1],m\in[0,1]} \quad ((1-m)\lambda'^*)^{\frac{1}{2}} - k(t).$$

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[15] All results from the main model also hold with Cobb-Douglas utility.

This gives first order conditions

$$\frac{1}{2}((1-m)\lambda'^*)^{-\frac{1}{2}}(1-m)\lambda_t'^* - k = 0,$$

$$\frac{1}{2}((1-m)\lambda'^*)^{-\frac{1}{2}}((1-m)\lambda_m'^* - \lambda'^*) = 0,$$

where

$$\lambda_t'^\dagger = -\frac{\frac{\sqrt{2}((1-m)\lambda'^*)^{-1/4}}{(1-t)^2}}{\frac{\sqrt{2}((1-m)\lambda'^*)^{1/4}(-\frac{1}{4}((1-m)\lambda'^*))^{-3/2}(1-m)}{1-t} - 1} > 0,$$

and

$$\lambda_m'^\dagger = -\frac{\frac{\sqrt{2}((1-m)\lambda'^*)^{1/4}(-\frac{1}{4}((1-m)\lambda'^*))^{-3/2}(-\lambda'^*)}{1-t}}{\frac{\sqrt{2}((1-m)\lambda'^*)^{1/4}(-\frac{1}{4}((1-m)\lambda'^*))^{-3/2}(1-m)}{1-t} - 1} > 0.$$

Since the production function is continuous in $t$ and $m$ and $[0,1]$ is compact, a solution exists by the Extreme Value Theorem.

Turning now to the results on complementarity and substitution, of interest again is the effect of a change in the cost of targeted repression on the level of mass repression, given by

$$\frac{dm'^*}{dk} = \frac{dm'^*}{dt'^*}\left(\frac{dt'^*}{dk}\right).$$

Differentiating $t'^*$ implicitly,

$$\frac{dt'^*}{dk} = -\frac{-1}{-\frac{1}{4}\left((1-m)\lambda'^*\right)^{-3/2}\left((1-m)\lambda_t'^*\right)^2 + \frac{1}{2}\left((1-m)\lambda*'^*\right)^{-1/2}(1-m)\lambda_{tt}'^*},$$

which is negative when $\lambda_{tt}'^* < 0$. The proof of Proposition 1 shows this holds in equilibrium.

The cross-partial of the regime's objective function signs the relationship between targeted and mass repression. Complementarity holds when

$$\frac{1}{2}((1-m)\lambda'^*)^{-\frac{1}{2}}((1-m)\lambda'^*_{mt} - \lambda'^*_t) > 0.$$

Given the functional form assumptions,

$$\lambda'^*_{mt} = \frac{(1-t)(1-m)\left(\sqrt{2}((1-m)\lambda'^*)^{1/4}\right)\left(-\frac{1}{4}((1-m)\lambda'^*)^{-3/2}\right)(1-m)\lambda'^*_t}{\left((1-t)(1-m)\right)^2}$$

$$-\frac{\left(\sqrt{2}((1-m)\lambda'^*)^{1/4}(-(1-m))\right)}{\left((1-t)(1-m)\right)^2},$$

and is positive when[16]

$$(1-t)(1-m)\frac{-\sqrt{2}((1-m)\lambda'^*)^{1/2}}{(1-t)\left(\sqrt{2}(1-m) - 4(1-t)((1-m)\lambda'^*)^{7/4}\right)} > -1.$$

Targeted and mass repression are complements for the government if

$$\frac{1}{2}((1-m)\lambda'^*)^{-1/2}(1-m)^2\lambda'^*_{mt} > k.$$

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[16]Using Cobb-Douglas utility for citizens, $\lambda'^*_{mt}$ is always positive.

# Appendix C: Wages Increasing in Repression

In this appendix, I relax the assumption that wages are decreasing in labor supply and compare the government's choice of targeted and mass repression in each case. I call $Y(\cdot)$ the production technology where the wage is the marginal product of labor and wages are decreasing in the labor supply. This is the production technology employed for the main analysis. $Y^{\ddagger}(\cdot)$ is a production technology for which the equilibrium wage is still derived from the market clearing conditions in Lemma 1 as market clearing relies on no assumptions about the relationship between wages and changes in the labor force. However, the relationship between wages and labor supply for production technology $Y^{\ddagger}(\cdot)$ may be constant or increasing.

When wages are increasing in labor supply, $\lambda^{\ddagger}$ can only take one value, $\lambda^{\ddagger} = 1$. No individual will participate in the opposition because the economy will sustain a wage such that all citizens prefer the labor market to the opposition group. That is, for each individual that chooses to participate in the labor force, the wage rises, making even more individuals with higher types $\theta_i$ willing to work. This cascades until attaining full labor force participation.

When wages are increasing in labor supply, the regime will not find using either type of repression optimal in equilibrium. Since labor force participation is already full, i.e. $\lambda^{\ddagger*} = 1$, repression can have no positive effect. Using targeted repression has a no effect and only generates a cost, as there are no opposition group members for the government to target. Therefore, the regime will avoid the cost from $k$ and choose $t^{\ddagger*} = 0$. The government will also choose $m^{\ddagger*} = 0$ because using any $m^{\ddagger*} > 0$ only has a direct effect of reducing the labor pool and no effect on labor force participation.

The case of constant wages is addressed in Remark 1.

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