Why Divest? The Political and Informational Roles of Institutions in Asset Stranding

Murray Carlson, Adlai Fisher, Ali Lazrak*

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Abstract

We model stakeholder-driven institutional divestiture that promotes stranding of harmful assets through both a political channel and financial prices. We introduce two novel mechanisms. First, institutional divestiture weakens stakeholders' asset exposures, improving political conditions for stranding. Second, institutional divestiture credibly communicates information about citizen preferences, environmental harm, and economic benefits to financial markets and political participants. These channels drive harmful-asset divestiture, which reduces the asset price and raises its strand probability. Support for divestiture increases under supermajority strand requirements, and when institutions internalize rest-of-world welfare. We detail the equilibrium interactions between information, divestiture, prices, and stranding in a dynamic, rational-expectations game.

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*Sauder School of Business, University of British Columbia, 2053 Main Mall, Vancouver, BC, V6T 1Z2. emails: murray.carlson@sauder.ubc.ca, adlai.fisher@sauder.ubc.ca, ali.lazrak@sauder.ubc.ca. We thank for helpful comments Francesco Sangiorgi, participants at the HEC-McGill Winter Finance Workshop, and the UBC reading group on political economy and finance. David Barkemeyer provided outstanding research assistance. We gratefully acknowledge financial support from the Social Sciences and Humanities Research Council of Canada and the Natural Sciences and Engineering Research Council of Canada.

1 Introduction

The fossil-fuel divestment movement aims to persuade universities and other endowed institutions to sell portfolio securities issued by firms that own reserves of coal, oil, or gas or directly participate in transportation or downstream refining. Divestment might be important if it increases the cost of capital and reduces the growth of these industries (Heinkel et al. (2001)). Prior work has however struggled to identify a quantitatively significant environmental impact resulting from the economic consequences of divesting.[1] It has also been argued that divestment might be counterproductive because it removes a direct channel of environmental advocacy through shareholder governance mechanisms, or worse yet removes shareholders who might otherwise bring appropriate attention to negative externalities associated with corporate activity.[2]

We provide a formal theory of divestment that places an *institution* (Commons, 1931) at the centre of the action.[3] Empirically, the divestment movement works predominantly through institutions including universities, churches, corporations, governments, pension funds, and philanthropic endowments.[4] We therefore believe a theory founded on the role of institutions is necessary to understand divestment activism. Commons explained: "We may define an institution as collective action in control, liberation, and expansion of individual action... Indeed, these collective acts are at times more powerful than the collective action of the political concern, the state."[5] Our theory of divestment invokes these same elements: a democratic state, individual citizens, and an institution governing the collective divestment action of its stakeholders.[6]

In our model, the state must at the terminal date make a decision about *asset strand-*

[1] See, for example, Berk and van Binsbergen (2022), who state "We conclude that current ESG divesture strategies have had little impact and will likely have little impact in the future." See also De Angelis et al. (2022). A contrasting and popular view is that "the fossil fuel divestment movement can succeed where politics failed." (Keith, 2013).

[2] Opposite to the recommendation to divest, Broccardo et al. (2022) argue for the direct effectiveness of "voice" made available to shareholders. In addition, if divestment succeeds, the shareholder base will become less environmentally friendly and might undertake actions that pollute more but were previously avoided. See also Oehmke and Opp (2023) and Edmans et al. (2022) for related alternatives.

[3] See also Hodgson (2006).

[4] See https://divestmentdatabase.org/, reporting 1552 instiutions divesting 40.5 trillion dollars worth of assets as of November 17, 2022.

[5] This belief in the power of institutions is shared by climate activists, who cite the political capital generated by divestment activism as a key motivation (Keith, 2013).

[6] We also consider that the externality may negatively impact individuals outside the state, which impacts welfare analysis but not the equilibria of our game. Extensions to multi-state settings would allow the extra-state externalities to play a more important role.

ing, or permanently shutting down a productive but harmful asset that imposes negative externalities on its own citizens and the rest of the world. The state is not a separate player in a game-theoretic sense, but makes its decision by a democratic vote of its citizens, and we consider flexibility as to both majority or supermajority rules for the asset-stranding decision.[7] Individual citizens have conflicting preferences about asset stranding due to different exposures to the externality. Individuals also have economic interests in the harmful asset, holding either individual shares (if institutional outsiders) or indirect claims through the institution (if institutional stakeholders). The institution permits collective action by, at a date prior to the state decision on asset stranding, allowing its stakeholders to vote on institutional divestment, a collective action that if carried out replaces the institution's stakeholdings in the harmful asset with cash. Divestment, if undertaken, thereby reduces all institutional stakeholders' economic interests in the harmful asset, making them more favorably disposed to vote for asset stranding at the state level.

We highlight two distinct channels through which institutional divestment affects the probability of asset stranding. First is the political channel previously described. Institutional divestment reduces the economic exposure of *all* institutional stakeholders to the harmful asset, and because of their reduced skin in the game they are more likely to vote in favor of asset stranding at the state level. Second, we model an informational channel for institutional investment. Divestment activists emphasize the importance of the divestment movement for educating institutional decisions-makers about environmental harm, ethical responsibilities, and the priorities of institutional stakeholders (Keith, 2013). In our model, institutional governance takes place by democratic vote of all stakeholders (where stakeholders are reciprocally defined by having a utility interest in the financial strength of the institution). To model the information produced by institutional deliberation, we endow all institutional stakeholders with a common, non-public signal about the expected future social losses from harmful externalities. The institutional stakeholders use the signal in their divestment decision. The model is not "rigged" so that institutional stakeholders always receive bad news about externalities and always want to divest. Instead, we model a rational expectations equilibrium, where stakeholders receive an unbiased signal about environmental harm and this signal influences their divestment votes in an expected utility maximizing framework. We identify ranges of parameters for which a separating equilibrium exists, in which case divestment occurs only when the institutional stakeholders receive bad news about environmental externalities. In the separating equilibrium, financial market prices ra-

[7] The voting threshold of the super majority rule is qualitatively important to our analysis.

tionally react to the divestment decision, conveying information to the broader public. In the case of divestment, the price of the harmful asset falls, and ordinary citizens are more likely to vote for asset stranding. The political and information channels work precisely through financial markets and harmful-asset security holdings as environmental activists have targeted, and demonstrate novel theoretical mechanisms through which institutions lever the power of individuals through collective action.

Our model rests on three important assumptions. First, divestment is a political process inside the institution, that is, a collective decision that has to be made in the face of a conflict of preferences between the institution stakeholders. This important aspect of divestment is absent in previous literature. We emphasize it with a direct democracy model based on a majority rule where institution stakeholders who disagree about the tradeoffs between economic benefits and externalities must cast their vote for or against divestment.

Second, prior to voting on divestment, the institution produces novel information that is priced by financial markets. In the model this information can be about the likelihood of externalities if the asset operates, the magnitude of harm, or about aggregate preferences. We aim to capture the idea that the institutions targeted by divestment activists have the unique ability to credibly diffuse relevant information about environment harm and its externalities to the larger public. Universities for example may be special if they have experts in a variety of disciplines whose combined knowledge is important to understanding the full extent of environmental harms. Churches may be special because they have high credibility based on identity, and because they may have special understanding of ethical responsibilities and the utility calculus that members of their group may eventually be faced with if they must observe environmental harm to others. Because our institutional information channel is about any part of the expected externalities from operating the harmful asset, the information can be very broadly interpreted, from the scientific probability of harm, to the degree of damages, to how citizens will feel if the harm state occurs and whether they will internalize the suffering of others. Third, we model environmental regulation as an activity of the state at the terminal date, determined by collective decision of the entire population via direct democracy. In the model regulation is starkly modelled as stranding that makes the harmful asset inoperable, but other types of restrictive regulations such as a tax based on emissions would not qualitatively change the conclusions of our model. When voting for stranding, citizen tradeoff their utility exposure to the harmful-asset externality with the utility benefit they may receive from higher economic payoffs of the harmful asset.

Based on these assumptions we build a model with a financial market where securities are priced efficiently, jointly with the institutional and political decisions for divestment and asset stranding. For both the divestment vote and the stranding vote, our voting model is a standard spatial voting model (Inman (1987)) where the citizens themselves make the divestment/stranding choices. Our model is therefore a direct democracy voting model that abstracts from political representation and the selection of electoral platforms.

Our voting model is simple because the preference heterogeneity among citizens is single dimensional. In a voting model with a binary decision and a single dimensional heterogeneity, the political equilibrium is given by the median voter theorem: the citizen with median disutility from the externality acts as a dictator. In this context, preference misrepresentation cannot enhance the private welfare and as a result, there are no incentives to be strategic when voting. Consequently, all citizens vote sincerely: They vote for the policy that maximizes their utility without considering whether they are pivotal or not. [8]

With this simple model, we provide several novel insights. First, even if divestment means that the institution shareholders lose their ability to modulate their vote for stranding based on the cash flow realization, they may still divest in order to communicate to the remaining population the nature of the information they receives. If that happens, divestment becomes a pivotal event in the sense that an environmental reform that is defeated in a vote in the absence of divestment can very well be adopted in presence of divestment.

This happens because, due to divestment, the voting share supporting stranding increases for two reasons. First, when divesting, the institution's stakeholders vote systematically for stranding because they have no cash flow benefits from the industry securities. Second, for the remaining population of citizens outside the institutions, divestment conveys bad news about the externality and this convert some of those citizens from regulation opponents into regulation supporters. All these effects play out in a fully revealing rational expectation political equilibrium where the divestment decision fully conveys the information produced by the institutions to all citizens and where financial markets price the industry security while anticipating the cash flow state contingent stranding vote outcome.

This first insight illustrates how divestment can be consequential when we account for its political implications. It is important that in our model, divestment does not change

[8]In more general contexts, for example when voting is about multiple issues, or if the heterogeneity among citizens is of higher dimension, strategic voting can become an important aspect of equilibrium strategy and give additional insights about interactions between financial markets and voting.

environmental preferences which are assumed to be stable. Rather, divestment alters the incentives to vote for the stranding regulation. An additional insight of our model is that divestment can represent a second-best process to get closer to efficiency when supranational political constraints are hard to overcome.

Our model relates to diverse aspects of the political economy literature. First, we build on standard voting models such as Feddersen and Pesendorfer (1996) and Austen-Smith and Banks (1996). Second, our model stands in sharp contrast to the literature on lobbying (e.g. Grossman and Helpman, 2001), which emphasizes scenarios where highly concentrated special interests may be especially influential in politics. Lobbying theories generally predict that when shareholder, rather than corporate, lobbying is important, concentrated shareholdings should lead to greater political influence through fewer externalities to minority shareholders. Further, lobbying will tend to be most effective for opaque issues that are not of general interest to voters. Our results stand in sharp contrast. In our model, widely held shareholdings tend to be protective for the harmful asset because all citizens have skin in the game for the benefits of the harmful asset, reducing their incentives to vote for asset stranding. Divestment narrows the shareholder base of the harmful asset in our model, and produces a group of citizens who are solidly committed to asset stranding.

Important contributions to the divestment literature include Berk and van Binsbergen (2022), Oehmke and Opp (2023), and Broccardo et al. (2022). Much of the literature on ESG builds on the assumption that ESG-investors derive a utility benefit from investing in ESG stocks (Heinkel et al., 2001). Important results include a CAPM formula with an ESG factor (Pástor et al., 2021; Pedersen et al., 2021). ESG stocks have lower expected returns in these models, but may have higher returns in transitions where ESG preferences become stronger, and empirically the evidence is mixed (Pastor et al., 2022). The broader literature addresses important questions such as the effectiveness of divestment versus voice in corporate governance, and the relative effectiveness of green-firm incentives versus brown-firm penalties. The central role of institutions in the divestment movement does not play an explicit role in these models.

The central issue of the political economy of climate is how to manage assets with potentially harmful externalities. Economics provides widely accepted tools such as carbon taxes (e.g., Marron and Toder, 2014), but implementation faces important problems. The "tragedy of the commons" (Hardin, 1968) between countries requires a high-degree of international coordination. Further, even within individual nations policy commitment is difficult due to election cycles (Besley and Persson, 2023).

A long tradition in economics and the social sciences proposes that institutions play a key role where government policy fails. Our model takes this approach. Institutional divestment enhances the ability to achieve asset stranding, and the efficiency of stranding decisions, in societal decisions reached through politics (voting). Our model thus offers a formal channel through which institutional divestment drives carbon transition risk (Bolton and Kacperczyk, 2021, 2022). Specifically, in our model divestment is non-neutral for political decisions on regulation. Our theory also offers the interpretation that divestment strengthens "green values" (Besley and Persson, 2023) by severing economic ties of institutional stakeholders to the harmful asset. This creates a stable group of committed voters who support a green transition. Our theory is also consistent with recent empirical findings of announcement affects from institutional divestment (Becht et al., 2023), and provides a formal grounding for political and information channels that support their "narrative" interpretation.

An important branch of the literature in finance emphasizes feedback effects from financial markets to real decisions (Bond et al., 2012). This literature emphasizes that financial markets are not like casinos because market prices provide information that can help guide important real decisions such as investment and employment. Our paper adds a new dimension to this literature by showing feedback effects from financial market prices to political decisions. In our model, market prices impact the distribution of the intensity of preferences for asset stranding and therefore change the size of the coalition supporting the reform. When a minority coalition supporting the reform becomes a majority coalition, the reform is politically adopted. This perspective on financial market feedback to *political outcomes* is new to the literature.

2 A Model of Institutional Divestment

We assume four dates $t \in \{0, 1, 2, 3\}$ and an asset that produces output z at the terminal date $t = 3$. For simplicity, there is no investment or disinvestment and the normalized asset size is one. Asset productivity is given by a random variable $a \in [0, \infty)$ drawn at date $t = 2$ and observed by all agents. If the asset is put to productive use, output z simply equals productivity a. There are no operating costs so net output and output are identical. Operation of the asset requires a government license, which may be rescinded causing *asset* *stranding* and a final output of $z = 0$. Therefore,

$$z = \begin{cases} 0 & \text{if asset stranded} \\ a & \text{otherwise.} \end{cases} \tag{1}$$

We use a model of direct democracy to determine stranding. Citizens are denoted $i \in [0, 1]$ with total mass one. At date $t = 2$ after productivity a is known, citizens vote on stranding. The outcome is decided by a κ-majority rule, which requires support of a fraction κ of the population to strand (e.g., $\kappa = 1/2$ is simple majority and $\kappa > 1/2$ is a supermajority).

The central tension of the model is that all citizens have claims to asset payoffs, but are also exposed to negative externalities caused by asset operation. For simplicity, all citizens begin with claims having equal exposure to the asset cash flows z. However, the externalities faced by citizens (i.e., harm caused by asset operation) are heterogeneous across individuals. Citizens therefore generally differ in the net benefits they accrue from asset operation, which drives heterogeneity in voting behaviour regarding asset stranding.

An important element of the model is an institution composed of a mass $0 < \delta < 1$ subset of citizens whose asset claim is intermediated by the institution. We call citizens belonging to this subset *institutional stakeholders*. These stakeholders do not own the asset directly. Instead, their exposure to asset payoffs derives from the institution's ownership of the fraction δ of the asset and their institutional stake. For example, university employees care about the risk exposures of their institution's endowment because their future pay, benefits, and working conditions depend on the financial health of their employer. Similarly, members of pension plans that make collective decisions have exposure to all assets held by the plan. More broadly, members of any institution such as a church have a stake in the organization's financial health. At date $t = 1$, institutional stakeholders collectively make a decision about whether to *divest* ownership of the asset. Without loss of generality, the divestment decision is made by a majority vote of stakeholders.[9] If divestiture occurs, the shareholdings are sold at prevailing market price (which includes information about the outcome of the divestment vote) and stakeholders then have no exposure to the final asset payoff.

Institutions in the model are special first because they own assets and provide a channel for indirect asset payoff exposure of stakeholders. Additionally, we assume that the insti-

[9]Extending to a κ-majority in the divestment vote is straightforward at the cost of notation, but delivers qualitatively similar results because we already allow an arbitrary κ-majority for the strand vote. The key insights come from differences between the voting thresholds in the two votes, rather than an absolute threshold for either vote.

tutional deliberation process produces novel information. This can be information about the externalities caused by the asset, the economic benefits of the asset, or the attitudes of stakeholders to the externality. The information produced by the institution can be credibly communicated to stakeholders, and informs their divestment votes, but outside observers see the divestment vote as the only credible information provided by the institution.

We see the institutions in our model as comparable to universities, municipal governments, pension funds, religious organizations, and businesses that have considered diverse forms of divestment from, for example, fossil fuels or harmful state regimes (Apartheid). Each type of institution may have specialized knowledge about some aspect of the tradeoffs between benefits and externalities of the asset.

Figure 1 provides a timeline of events. We further elaborate our assumptions below.

Production and externalities ($t = 3$). Absent stranding, at $t = 3$ the risky asset produces output $z \in [0, \infty)$ determined by productivity a. Prior to $t = 2$ productivity a is unknown with density denoted by f, i.e.,

$$a \sim f \tag{2}$$

with cumulative density F.

Production using the risky asset may also produce environmental harm. If the risky asset operates (i.e., is not stranded), environmental harm occurs according to a binary random variable $\omega \in \{0, 1\}$, with harm occurring in state $\omega = 1$, and no harm in state $\omega = 0$.[10] The externality draw ω is assumed to be independent from productivity a.

If harm occurs, citizens experience heterogeneous losses of amount g_i with population distribution

$$g_i \sim h,$$

where h is a continuous density function on the support $[0, \infty)$. Citizens with higher values of g_i (green citizens) suffer more from the externality. We denote by H the cumulative density of g_i with inverse function H^{-1}. To shorten the notations, we denote by g^m the median of

[10]The linear utility specification below allows us to implicitly normalize the externality intensity in state $\omega = 0$ to zero and interpret the externality intensity of state $\omega = 1$ as incremental to that of state $\omega = 0$.

harm-loss parameter g_i and by q_κ, $q_{\kappa,\delta}$ the quantiles of the harm-loss parameter defined by

$$g^m = H^{-1}\left(\frac{1}{2}\right), \; q_\kappa = H^{-1}(1-\kappa) \text{ and, } q_{\kappa,\delta} = H^{-1}\left(\frac{1-\kappa}{1-\delta}\right). \tag{3}$$

The parameters g_i can have the interpretation of different objective exposures to environmental harm, such as the difference between citizens living in coastal areas vs. those living inland. Alternatively, variation in g_i could be due to different psychic costs of experiencing the harm state.

We also assume a safe production technology that allows transfer of wealth through dates at the riskless rate $r = 0$. If the institution divests from the harmful asset, proceeds are invested in the safe asset, and the institution no longer has exposure to the risky asset cash flows z.

Asset stranding ($t = 2$). At time $t = 2$, all citizens $i \in [0, 1]$ vote on asset stranding with the decision made according to κ-majority rule. If the strand vote succeeds ($s = 1$) risky asset operations are shut down, terminal output is zero, and the externalities are nullified. If the strand vote fails ($s = 0$), output $z = a$ will be realized and the externality occurs if the realized state is $\omega = 1$.

Institutional stakeholders. An institution plays a special role in our model. For simplicity we model a single, exogenously given institution composed of a mass $0 < \delta < \kappa$ of citizens drawn randomly from the population.[11] Without loss of generality, we assume that institutional stakeholders i are located in the interval

$$I \equiv [0, \delta].$$

Because citizens are assigned randomly, the distribution of harm-loss types i within the institution is identical to the population distribution, and our results are not driven by selection or institutional bias. Our framework offers many possibilities for extension including selection of types within institutions, endogenous formation, and/or multiple institutions with possibly dynamic interactions. The simple setting with a single, exogenously given institution nonetheless allows us to emphasize important political and informational roles for divestment.

[11] We restrict δ to be smaller than κ because otherwise the institution's stakeholder form a majority coalition in the total population and thus if they vote for divestment, they will *de facto* enforce stranding regardless of how the larger population perceives the stranding decision.

Three traits distinguish institutional stakeholders from other citizens:

1. Stakeholders experience a derived utility benefit from the financial well-being of the institution.

2. Stakeholders have a say in governance of the institution. In our model, the sole channel for stakeholder governance is voting on institutional divestiture.

3. Stakeholders observe information produced by the institution, prior to voting on divestment.

Stakeholders thus derive benefits from their association with the institution (1 and 3), and also have a say in governance (2). A downside is that collective decision-making within the institution implies that not all stakeholders will agree with institutional decisions. By contrast, citizens who are not institutional stakeholders make individual decisions about their asset holdings.

Preferences. At date $t = 3$, citizens have terminal utility of

$$u_{i3} = w_{i3}\mathbb{1}_{i \notin I} + (v_3/\delta)\mathbb{1}_{i \in I} - g_i \mathbb{1}_{\omega=1}\mathbb{1}_{s=0} \tag{4}$$

where w_{i3} is individual i's directly held asset claim and v_3 is the terminal value of the institution. The second term of the right hand side of equation (4) applies only to institutional stakeholders, and captures their derived utility benefits of institutional wealth. The amount v_3/δ is institutional value divided by stakeholder mass, so the integral of derived utility benefits across stakeholders equals institutional value. The utility benefit of an institutional stake is thus the same as equal-share ownership of institutional assets, but decisions about institutional assets are made collectively rather than individually and a citizen's institutional stake cannot be bought or sold.

The first two terms of the right hand side of equation (4) are potential sources of exposure to harmful-asset cash flows z. First, individual asset holdings with value w_{i3} may have direct exposures to z. In the second term, institutional ownership of the harmful asset implies sensitivity of the institution's value v_3 to harmful-asset cash flows z, and exposure to z then flows through to stakeholder utility. Institutional divestiture at an earlier date cuts off this institutional channel of utility sensitivity to harmful-asset cash flows. The distinction between direct holdings of the harmful asset and exposures intermediated by institutional stakeholding is important to our model. The final term of equation (4) captures that when environmental harm occurs ($\omega = 1$ and $s = 0$), citizens experience linear utility losses according to the parameters g_i.

Prior to date $t = 3$, citizens maximize their expected terminal utility given equilibrium strategies and available information. From the linearity of equation (4), citizens are risk-neutral. We further discuss these expected utilities below.

Information structure. Let Φ_t and Φ_t^M respectively be the information available to institutional stakeholders and to the financial market at date t. Since the only novel information in the model is produced by the institution, the public information Φ_t^M is in general coarser than the information available to the institution Φ_t at any date t. The conditional probabilities of the harm state are

$$\begin{aligned} \pi_t &\equiv \mathbb{P}\left(\omega = 1 | \Phi_t\right), \\ \pi_t^M &\equiv \mathbb{P}\left(\omega = 1 | \Phi_t^M\right). \end{aligned} \tag{5}$$

At time zero, all citizens begin with the same information $\Phi_0 = \Phi_0^M$ yielding the prior

$$\pi_0 = \pi_0^M = \mathbb{P}\left(\omega = 1 | \Phi_0\right). \tag{6}$$

At time $t = 1$ the institution produces a symmetric binary signal $\sigma \in \{0, 1\}$ with informativeness $\lambda \in [1/2, 1]$ defined by

$$\lambda := \mathbb{P}\left(\sigma = 1 | \omega = 1\right) = \mathbb{P}\left(\sigma = 0 | \omega = 0\right)$$

The signal σ produces the posteriors

$$\pi_1 \in \{\overline{\pi}, \underline{\pi}\}$$

with $0 \leq \underline{\pi} \leq \pi_0 \leq \overline{\pi} \leq 1$ and where $\overline{\pi}$ and $\underline{\pi}$ are defined by

$$\overline{\pi} := \frac{\lambda \pi_0}{\lambda \pi_0 + (1-\lambda)(1-\pi_0)}, \ \underline{\pi} := \frac{(1-\lambda)\pi_0}{(1-\lambda)\pi_0 + \lambda(1-\pi_0)} \tag{7}$$

Hence, bad news about the externality raises the probability of harm from π_0 to $\pi_1 = \overline{\pi}$ and good news lowers the probability of harm from π_0 to $\pi_1 = \underline{\pi}$.

When λ is 1, the underlying signal produces posterior beliefs $\overline{\pi} = 1$ and $\underline{\pi} = 0$ and thus reveals the true state. When λ is $1/2$, the signal produces the posterior belief $\overline{\pi} = \underline{\pi} = \pi_0$.

In that case, the signal is not informative and the posterior probability of the state $\omega = 1$ is identical to the prior probability of that state: $\pi_1 = \pi_0$.

Market participants outside the institution observe the divestment decision of the institution but do not directly observe the institution's information. In a fully revealing equilibrium, market information and institutional informational are identical, $\Phi_1 = \Phi_1^M$ and $\pi_1 = \pi_1^M$. No learning about the externality occurs at date two. In particular, because the productivity a is independent of the harm state ω, learning the realization of a at $t = 2$ produces no information about ω. Hence, $\pi_2 = \pi_1$ and $\pi_2^M = \pi_1^M$.

Institutional divestment ($t = 1$). Institutional stakeholders make a collective decision at $t = 1$, by simple majority vote, about whether to divest the institution's harmful-asset holdings.[12] The signal σ about the probability of enviromental harm is available to stakeholders when they vote on divestment.

We emphasize that, viewed in the framework of a dynamic game, the institution is not a distinct player. Instead, the institution is defined by the set of citizens that belong to it and the rules that govern its behaviour. The only action taken by the institution is the divestment decision, and that decision is completely determined by stakeholder votes.

If divestment occurs ($d = 1$), the institution severs economic ties to the harmful asset, and the derived utility channel of institutional stakeholder exposure to risky-asset cash flows is eliminated. We assume that foreign investors, who do not vote on stranding at time $t = 2$, buy all divested securities. When divestment fails ($d = 0$), the institution's stakeholders retain exposure to harmful-asset cash flows. Voting on divestment and trading take place simultaneously and our equilibrium therefore features joint determination of the security price and divestment vote outcome.

The assumption that foreign investors purchase all divested shares is a simple and parsimonious way of modelling *political non-neutrality* of divestment. Specifically, the divested shares move into the hands of investors who have no voting power for the strand vote at $t = 2$. Similar results could be obtained in our model if the buyers of divested securities were a non-marginal group of citizens with low vote count but concentrated holdings. Our theory therefore differs fundamentally from models that focus on lobbying and the power of concentrated shareholdings. In such models, voters with strong economic interests can use

[12] The model easily generalizes to permit any κ-majority rule for divestment, but no additional insights are gained from this generalization. We allow a κ-majority vote for stranding and this potential heterogeneity between divestment and strand thresholds is important to our results.

economic power to "buy" votes. Our model shows the other side of the coin. In a democracy, concentrating economic interest in a harmful asset reduces incentives of the broader citizenship to vote for sustaining that asset. Institutional divestment thus can change voting incentives.

A central contribution of our paper is therefore to show an important force opposing concentration of economic interests in a democracy. Models of lobbying generally emphasize how concentrated economic power can generate political power through coordinated actions to sway politicians. Our model suggests that for decisions that are of broad interest to the voting public (as opposed to narrow and esoteric interests that may not motivate voters), an important opposing force is that divestment of economic stakeholding in the status quo leads to greater political support for reform.[13]

The security market. The security claim on the risky asset cash flow z is a stock traded in a competitive market at price P_t for $t \in \{0, 1, 2\}$. At time $t = 2$ after productivity a is observed, the price must satisfy

$$P_2 = \begin{cases} 0 & \text{if asset stranded,} \\ a & \text{otherwise.} \end{cases} \tag{8}$$

At $t = 1$, institutional stakeholders may posses an informational advantage relative to other citizens due to their knowledge of harmful-asset externalities. We assume that institutional stakeholders do not trade on their own account, so that market prices are set by the beliefs π_t^M of other citizens. We envision institutional stakeholders not to be professional traders, of small size δ relative to the population, and therefore not to directly impact prices through trade. Alternative models could weaken non-trading of institutional stakeholders by introducing frictions such as risk aversion, wealth heterogeneity, and noise traders, but at the cost of model simplicity.[14]

The majority of our analysis below focuses on a fully-revealing rational expectations equilibrium, where the outcome of the divestment vote at $t = 1$ credibly communicates

[13] *Political neutrality* of the divestment vote in our model would occur in the knife edge case where the voting power of citizens who change from supporting to opposing stranding after purchasing the divested securities exactly equals the voting power of institutional stakeholders who switch from opposing to supporting stranding after divestment.

[14] In particular, if institutional stakeholders are risk averse, have low wealth relative to the population, and noise trading imposes risks, we would expect limited willingness to engage in aggressive information-based trade and therefore small price impact from private information.

institutional information about the harm state. In particular, divestment occurs under bad news about the harm state $\pi_1 = \overline{\pi}$, and no divestment communicates good news about the harm state $\pi_1 = \underline{\pi}$. The price P_1 must reflect this information as well as forward-looking anticipation of productivity a and the outcome of the strand vote. When divestment takes place, harmful-asset sales occur at price P_1 that appropriately reflects the information contained in the divestment decision.

There are no motives for non-stakeholder citizens to trade on their own account in our model. Citizens are risk-neutral, and so long as assets are priced fairly using market information there are no gains to private trade. In the equilibria we consider, non-stakeholder citizens do not trade on their own account even though we allow them to do so.

Initial endowments and expected utilities. In order to simplify the model, we make strong assumptions on initial endowments. At date $t = 0$ all citizens who are not institutional stakeholders ($i \notin I$) receive total ownership of the fraction $1 - \delta$ of the risky asset, equally divided. The remaining fraction δ of the risky asset is endowed to the institution. These initial endowments ensure that if no divestiture or other trade occurs, all citizens whether institutional stakeholders or not have equal exposure to cash flows z. Utility derived from cash flows z would then be uniformly distributed over the unit interval of citizens, aggregating to z. Endowments of the risk-free asset are assumed for simplicity to be zero for all citizens, but do not meaningfully affect our analysis.

Our assumption that initial claims to the risky asset are equal across citizens is a useful benchmark because it mirrors the assumption of equal voting rights across citizens. Our results are therefore not driven by differences in the distributions of initial claims and voting rights. At the same time, our results do not depend on this symmetry. Our model focuses on heterogeneity in exposure to externalities, g_i, as the driver of differences in voting behaviour. Similar divestment equilibria could be obtained with heterogeneous initial endowments of the harmful asset.

From the prior assumptions, individual wealth and institutional value are:

$$w_{i3} = a\mathbb{1}_{s=0}\mathbb{1}_{i\notin I}, \tag{9}$$

$$v_3 = \delta\left(a\mathbb{1}_{s=0}\mathbb{1}_{d=0} + P_1\mathbb{1}_{d=1}\right). \tag{10}$$

Individual wealth equals productivity a as long as the asset is not stranded, and applies to citizens outside the institution. The insitution's value v_3 provides benefits to citizens of mass

δ, according to productivity a if the risky asset is not divested and not stranded, and in the amount of the first-period stock price P_1 if the risky asset is divested.

At time $t = 2$, after observing productivity a but before the strand vote takes place, citizen i can assess their expected utility under different outcomes of the strand vote. We first consider the possibilities for an institutional stakeholders $i \in I$

$$u_{i2} \equiv \mathbb{E}\left(u_{i3}|\Phi_2\right) = \begin{cases} (a - g_i\pi_2)\mathbb{1}_{s=0} & \text{for} \quad d = 0, \\ P_1 - g_i\pi_2\mathbb{1}_{s=0} & \text{for} \quad d = 1. \end{cases} \tag{11}$$

Comparing the expected utilities of stranding to not stranding gives for any $i \in I$,

$$\Delta_{\text{s}} u_{i2} := u_{i2}(s = 1) - u_{i2}(s = 0) = \begin{cases} g_i\pi_2 - a & d = 0, \\ g_i\pi_2 & d = 1. \end{cases} \tag{12}$$

From equation (12), following divestiture ($d = 1$) all institutional stakeholders will prefer asset stranding since $g_i > 0$ for all i. In other words, citizens who have divested have no possible economic gain from the harmful asset but are exposed to externalities, and so will always vote for stranding. If divestiture has not occured ($d = 0$), stakeholders trade off their expected externality $g_i\pi$ against the cash flow a.

For any non-stakeholders, $i \in [\delta, 1]$, the $t = 2$ expected utilities and differences are given by

$$u_{i2} \equiv \mathbb{E}\left(u_{i3}|\Phi_2^M\right) = \begin{cases} 0 & \text{for} \quad s = 1, \\ a - g_i\pi_2^M & \text{for} \quad s = 0. \end{cases} \tag{13}$$

and

$$\Delta_{\text{s}} u_{i2} := u_{i2}(s = 1) - u_{i2}(s = 0) = g_i\pi_2^M - a. \tag{14}$$

Non-stakeholders view asset stranding similarly to non-divested stakeholders, as a tradeoff between expected externalities vs. cash flows, but with potentially different beliefs π_2^M.

Voting. Two votes take place sequentially in our model: divest at $t = 1$, and strand at $t = 2$. The divest vote involves only institutional stakeholders. The strand vote involves all citizens. In each poll, voters have equal voting weight and cast a single ballot for or against the relevant decision. Both voting models are standard spatial majoritarian voting models (Inman (1987)) of direct democracy, abstracting from issues of political representation and agenda setting.

We assume that voters are self-interested, that is, they cast their vote to maximize their own expected utility conditional on available information. Voters use Bayes' rule to update beliefs. We assume *sincere voting* in the sense that voters cast their ballot as if they were able to unilaterally decide whether the reform is adopted. Sincere voting can be formally justified whenever the conditions for the *the median voter theorem* (Black (1958)) hold: in particular if heterogeneity in preferences is single dimensional and the policy choice is binary, then preferences are necessarily single peaked.[15] When the median voter theorem holds, the political equilibrium is unique and coincides with the preferred individual decision of the median voter. Voting sincerely is then an undominated strategy. Consequently, any citizen $i \in [0,1]$ votes for stranding if and only if

$$\Delta_{s} u_{i2} > 0$$

where we recall that the difference in expected utility between stranding and not stranding, $\Delta_{s} u_{i2}$, is defined in equation (12) when $i \in I$ and in equation (14) when $i \in [\delta, 1]$.[16]

In the strand vote at $t = 2$ we allow the decision to be made by an arbitrary κ-majority rule rather than simple majority. Given this generality, the term "median voter" is too restrictive,[17] and we instead define the *critical voter* as the citizen whose expected utility from stranding relative to not-stranding is the κ-smallest. The political equilibrium is then determined by the preferences of the critical voter: The strand vote passes if the critical voter favors it, and fails if the critical voter does not favor it. In other terms, the preferred stranding policy of the critical voter is the collective stranding policy that emerges from voting. Since the divest vote at $t = 1$ is by simple majority, the critical voter in this poll is the median voter.

In the divestment vote at $t = 1$, institutional stakeholders are farsighted, understanding that the divestment decision can be informative to the larger population about the harmful

[15] This result will hold even if we extend to the model to include multiple policy choices as opposed to binary decisions as long as the policy set is single dimensional and preferences are single peaked or, alternatively, satisfy a single crossing condition (Gans and Smart (1996)).

[16] Without loss of generality, we assume that citizens vote against stranding when indifferent. The results of this paper will not change with alternative assumptions on the tie breaking rule for voting because all voters are infinitesimal. In particular, our results hold if citizen randomize between voting for stranding or against it when indifferent.

[17] The term "pivotal voter" would also not be appropriate since we model a continuum of voters none of which can be pivotal.

externality. Institutional stakeholders thus account for the fact that their votes at $t = 1$ can influence the strand vote at $t = 2$. Accordingly, stakeholders observe the signal produced by the institution, and based on their expectation on the strand vote, they calculate their expected utility at time $t = 1$,

$$u_{i1}(d = 1, \Phi_1) := \mathbb{E}\left(u_{i2} | d = 1, \Phi_1\right), \text{ and, } u_{i1}(d = 0, \Phi_1) := \mathbb{E}\left(u_{i2} | d = 0, \Phi_1\right). \tag{15}$$

and the resulting difference in expected utility

$$\Delta_{\mathrm{d}} u_{i1} := u_{i1}(d = 1, \Phi_1) - u_{i1}(d = 0, \Phi_1). \tag{16}$$

Any stakeholder $i \in I$ votes for divestment if and only if $\Delta_{\mathrm{d}} u_{i1} > 0$.

3 Equilibrium Analysis

Broadly speaking, the only channel through which divestment impacts the voters expected utility at the divestment stage $t = 1$ is by changing the outcome of the strand vote. This is because, the stranding policy is perfectly anticipated and financial markets will correctly price the risky asset security. When the institution liquidates its holdings, it get a fair price for these holdings and distribute the proceeds of divestment equally to all the stakeholders. By divesting, institution stakeholders have the opportunity to commit a support of mass δ for the reform before knowing the realization of the productivity a. Relative to the case where divestment is defeated, divestment converts those institution members with low g_i from voting against stranding to voting for stranding and, for some productivity realizations, these conversions contribute to produce a pivotal increase in the support for stranding. In those regions of productivity, stranding will be adopted if divestment took place and rejected if divestment was defeated. Such pivotal events may be welcomed by some institutional stakeholders notably those with large g_i but are distasteful for the stakeholders who hold a low harm-loss parameter g_i. The institution divests if and only if the coalition whose members welcome the commitment at the expense of loss of flexibility associated to divestment forms a majority coalition among the stakeholders.

We establish the conditions lead to the existence of *rational expectations political equilibrium* (or simply equilibrium) where stakeholders form a belief about the information that will be revealed to the larger population and anticipate the strand policy that emerges from voting. We identify two type of equilibria with pure strategies.[18] In a fully revealing equilibrium, divestment occurs if and only if the information about the externality is negative ($\pi_1 = \overline{\pi}$). In that case, *divestment is a pivotal event*, that is, the news occurrence of divestment changes the set of productivity states under which stranding is politically supported and results in a price impact on the asset claim. In a pooling equilibrium, the divestment decision does not reveal any information to the larger population and as a result, institution outsiders vote on stranding on the basis of the prior beliefs $\pi_2^M = \pi_0$.

First, we study the voting share of stranding and how it changes with the political and informational channels through which divestment impacts the stranding decision. Second, we consider the benchmark stranding adoption policy in the absence of a divestment campaign. Third, we consider the stranding policy when divestment can happen but the institution does not produce any new information about the externality state. In that case, the informational channel of divestment is shut down and only the political channel is present. We finally discuss our main case where divestment has both political and informational implications and characterize the conditions under which a rational expectations political equilibrium exists.

3.1 Voting share and critical voters

Prior to voting on the reform, citizens observe the productivity state $a \in [0, \infty)$. When voting for stranding, stakeholders hold the beliefs $\pi_2 \in \{\overline{\pi}, \underline{\pi}\}$ while non stakeholders hold the belief $\pi_2^M \in \{\pi_0, \overline{\pi}, \underline{\pi}\}$. In a pooling equilibrium, no information is revealed to the market and hence we have $\pi_2^M = \pi_0$. In a fully revealing equilibrium, the information produced by the institution is revealed to the institution outsiders: $\pi_2 = \pi_2^M$. We summarize the relevant variables to calculate support for stranding by the quadruplet (a, π_2, π_2^M, d) where we recall that $d = 1$ when divestment happens and $d = 0$ otherwise. As a first step of our analysis, we take the information available to the market as given and therefore the result of this section should be interpreted as partial equilibrium results. As we discuss later in the equilibrium sections of paper, the decision to divest can itself be informative to institution outsiders and as a result, the posterior π_2^M is in fact endogenous in a rational expectation political equilibrium setting.

When divestment is rejected by a majority of stakeholders, $d = 0$, the total mass of voters

[18] A mixed strategy equilibrium may also occur for certain parameter values.

supporting stranding is given by

$$m(a, \pi_2, \pi_2^M, 0) = \delta \left[1 - H\left(\frac{a}{\pi_2}\right)\right] + (1-\delta)\left[1 - H\left(\frac{a}{\pi_2^M}\right)\right]. \tag{17}$$

To understand equality (17) observe that when divestment is defeated, all citizens hold one unit of the risky asset when voting for stranding and they cast their votes by comparing the utility of leaving the industry in operation to the utility if it is shut down.

When the realized productivity is given by a, the *swing voter* for stranding, defined as the citizen who is indifferent between stranding or not, has a harm loss from the externality that is given by $g_i = \frac{a}{\pi_2}$ when that citizen is a stakeholder and the harm-loss parameter $g_i = \frac{a}{\pi_2^M}$ otherwise. Stakeholders with harm-loss parameter $g_i \geq a/\pi_2$ vote for stranding while citizens outside the institution vote for stranding if and only if $g_i \geq a/\pi_2^M$. Because the fraction of stakeholder in the total population of citizens is δ, the total mass of citizens supporting stranding is given equation (17) and stranding is adopted whenever $m(a, \pi_2, \pi_2^M, 0) \geq \kappa$. This implies stranding receives a voting share that is larger than κ when the productivity parameter is $a \leq a^*$ where the threshold a^* solves $m(a^*, \pi_2, \pi_2^M, 0) = \kappa$. The institution outsider who has the harm-loss parameter $g_i = a^*/\pi_2^M$ preferred stranding policy also applies the productivity threshold a^*. Therefore, when the institution forgoes divestment, the critical voter for stranding is the institution outsider with harm loss parameter $g^{c,0} = a^*/\pi_2^M$.[19] While the critical voter harm-loss parameter $g^{c,0}$ depends on the variables $(\delta, \kappa, \pi_2, \pi_2^M, d)$, we have not made this dependence explicit to keep the notations manageable.

When divestment receives majority support among the stakeholders ($d = 1$), the total mass of voters supporting stranding is given by

$$m(a, \pi_2, \pi_2^M, 1) = \delta + (1-\delta)\left[1 - H\left(\frac{a}{\pi_2^M}\right)\right]. \tag{18}$$

The first term of the right hand side of equation (18) is the fraction δ of the total population who divest and vote for stranding because they have no cash flow disincentive associated with stranding. The remaining population of size $1-\delta$ cast their votes for stranding by comparing the utility of leaving the industry in operation to the utility if it is shut down. When the

[19] When the institution forgoes divestment, there is a second critical voter for stranding that we do not highlight in our discussion. Because all stakeholders hold the risky asset through the institution holdings, the preferred stranding policy of the institution stakeholder with harm-loss parameter $g_i = a^*/\pi_2$ is also a strand policy based on the threshold a^*. Therefore that institution stakeholder with harm-loss parameter $g_i = a^*/\pi_2$ is also a critical voter for stranding.

realized productivity is given by a, the swing voter for stranding is the institution outsider who has the harm-loss parameter $g_i = \frac{a}{\pi_2^M}$. Any citizen with harm loss satisfying $g_i \geq \frac{a}{\pi_2^M}$ votes for stranding and therefore the mass of citizens who cast their vote for stranding in the population of non stakeholders is $1 - H(\frac{a}{\pi_2^M})$. The total voting share for stranding is thus $\delta + (1-\delta)(1 - H(\frac{a}{\pi_2^M}))$. This last expression is exactly equal to $m(a, \pi_2, \pi_2^M, 1)$ as given by equation (18). Stranding will be supported by a κ-majority if and only if $m(a, \pi_2, \pi_2^M, 1) \geq \kappa$ or equivalently, $a \leq \pi_2^M g^{c,1}$ where

$$g^{c,1} = q_{\kappa,\delta}$$

and, where we recall that $q_{\kappa,\delta}$ is defined in equation (3). The critical voter for the stranding vote has therefore the harm-loss parameter $g^{c,1} = q_{\kappa,\delta}$.

The following proposition summarizes the critical voters for stranding, depending on whether or not divestment has occured.

Proposition 1. *Assume that when voting for stranding, stakeholders hold the beliefs* $\pi_2 \in \{\overline{\pi}, \underline{\pi}\}$ *while citizens outside the institution hold the belief* $\pi_2^M \in \{\pi_0, \overline{\pi}, \underline{\pi}\}$. *There exists a critical voter for stranding who is an institution outsider holding the belief* π_2^M. *When divestment fails, the critical voter for stranding is the insitution outsider who has the harm-loss parameter* $g^{c,0}$ *defined by*

$$\delta H \left(\frac{\pi_2^M}{\pi_2} g^{c,0} \right) + (1-\delta) H \left(g^{c,0} \right) = 1 - \kappa. \tag{19}$$

When divestment succeeds, the critical voter for stranding has is the institution outsider with harm-loss parameter $g^{c,1} = q_{\kappa,\delta}$ *defined in equation* (3). *The critical voter for stranding has a harm-loss parameter that is larger when divestment succeeds than when it fails,* $g^{c,0} \leq g^{c,1}$.

Proposition 1 shows that the decision to divest determines the location of the strand vote critical voter in the distribution of harm-loss parameters among all institution outsiders. When the institution divests (resp. forgoes divestment), the critical voter for stranding harm-loss is $g^{c,1}$ (resp. $g^{c,0}$). Since the critical voter for stranding is an institution outsider and holds the beliefs π_2^M, the voting outcome is equivalent to the vote outcome of a fictitious model where only institution outsiders have a voting right for stranding and where the super majority threshold is calibrated to produce the same critical voter as the one that emerged in the initial voting model. From this point of view, the vote on divestment can be thought of as a vote on which voting rule applies to the strand vote in the fictitious model.

When the institution divests, the supermajority requirement for stranding in the fictitious model is weakened. This is because, for any productivity realization a, all stakeholders automatically vote for stranding and as a result, a coalition of mass lower than κ is sufficient to strand the assets. Proposition 1 shows that when the institution divests, the asset is stranded if and only the critical voter with harm-loss $g_i = q_{\kappa,\delta}$ votes for stranding. The critical voter with harm-loss $q_{\kappa,\delta}$ votes for stranding if and only if all institution outsiders with harm-loss parameter in the region $g_i \geq q_{\kappa,\delta}$ also vote for stranding. This implies that the supermajority requirement for stranding in the fictitious voting model where only institution outsiders having a voting right is given by

$$\kappa_1 := 1 - H(q_{\kappa,\delta}) = \frac{\kappa - \delta}{1-\delta} \equiv k - \frac{\delta}{1-\delta}(1-\kappa) < \kappa.$$

Since $\kappa_1 < \kappa$, divestment can be thought of as a way to weaken the supermajority requirement for stranding.

Following the same reasoning, when the institution forgoes divestment, the supermajority requirement in the fictitious model where only institution outsiders vote for stranding is given by

$$\kappa_0 := 1 - H(g^{c,0}) = k + \delta \left[H\left(\frac{\pi_2^M}{\pi_2} g^{c,0} \right) - H\left(g^{c,0}\right) \right].$$

The supermajority requirement in the fictitious model can be larger or smaller than κ depending on the ranking of π_2 and π_2^M. In a fully revealing equilibrium, $\pi_2^M = \pi_2$ and the supermajority threshold in the fictitious model is the same as that of the initial voting model, $\kappa_0 = \kappa$. In a pooling equilibrium $\pi_2^M = \pi_0$, the supermajority requirement in the fictitious voting model is larger than κ that when the news about the externality state is positive, $\pi_2 = \underline{\pi}$ and; lower than κ when the news about the externality state is negative, $\pi_2 = \overline{\pi}$.

Before we turn to the analysis of the equilibrium, it is useful to discuss the increase of voting support for stranding due to divestment. In the absence of any informational impact of divestment, the market beliefs are not altered by the decision to divest, $\pi_2^M = \pi_0$. In that case, the difference in voting share supporting stranding when the institution divests and when the institution forgoes divestment $\Delta_d m(a, \pi_2, \pi_0)$ is given by

$$\Delta_d m(a, \pi_2, \pi_0) := m(a, \pi_2, \pi_0, 1) - m(a, \pi_2, \pi_0, 0) = \delta H\left(\frac{a}{\pi_2}\right). \tag{20}$$

for all realizations of productivity $a \in [0, \infty)$. Equation (20) shows that when uninformative divestment succeeds, the voting support for stranding increases relative to the voting support for stranding when divestment is forgone by the institution. When the institution divests, a fringe of citizens of mass δ exposure to the harmful asset is eliminated. In that fringe, only a fraction $H(a/\pi_2)$ would not have supported stranding if the institution retained ownership of the assets. This effect is captured by the right hand side term of equation (20) and it represents the political channel through which divestment increases the support for the reform.

When divestment is informative, the beliefs π_2^M become endogenous and depend on the divestment decision and the nature of the equilibrium we explore. Assume for example that the information produced by the institution leads to the posterior $\pi_2 = \overline{\pi}$ and that divestment reveals that information to the market. In that case, we have $\pi_2^M = \overline{\pi}$ when divestment is adopted and, $\pi_2^M = \underline{\pi}$ when divestment is rejected. In this framework, the difference in voting share for stranding when the institution divests and when it rejects divestment is given by

$$\Delta_d m(a, \overline{\pi}, \pi_2^M) := m(a, \overline{\pi}, \overline{\pi}, 1) - m(a, \overline{\pi}, \underline{\pi}, 0) = \delta H\left(\frac{a}{\overline{\pi}}\right) + (1-\delta)\left[H\left(\frac{a}{\underline{\pi}}\right) - H\left(\frac{a}{\overline{\pi}}\right)\right] \quad (21)$$

for all realizations of productivity $a \in [0, \infty)$. Equation (21) shows that the voting support for stranding increase for two motives. First, divestment increases the support for stranding through a political channel captured by the term $\delta H(a/\overline{\pi})$ and already explored in the discussion of equation (20). Second, the voting support for stranding increases through an informational channel of divestment. Relative to the benchmark where divestment is forgone by the institution, divesting leads some citizen from the fringe $1-\delta$ convert from strand opponents to strand supporters. The second term of the right hand side of equation (21) captures the informational channel of divestment. When divestment is forgone by the institution, citizens outside the institution are lead to form the erroneous posterior $\pi_2^M = \underline{\pi}$ and the support of the reform in the fringe $(1-\delta)$ of institution outsiders is given by $(1-\delta)(1-H(a/\underline{\pi}))$. If the institution divests, the fringe $(1-\delta)$ of citizen who are not stakeholders form the posterior $\pi_2^M = \overline{\pi}$ and the support of the reform in that fringe is given by $(1-\delta)(1-H(a/\overline{\pi}))$. The wedge $(1-\delta)[H(a/\underline{\pi}) - H(a/\overline{\pi})]$ is the mass of citizen who convert from stranding opponents to supporters and measures the voting support for stranding due to the informational benefit of divestment.

3.2 The divestment decision with no information production

In this subsection, we assume that divestment does not produce any information, that is, $\pi_0 = \overline{\pi} = \underline{\pi}$ and, therefore $\pi_2 = \pi_2^M = \pi_0$. This in turn implies that the critical voter for stranding when the institution forgoes divestment is given by $g^{c,0} = q_\kappa$. When divestment is uninformative, the only channel through which divestment impacts the stakeholders is the political channel induced by a commitment to stranding for the fringe δ of stakeholders. The following proposition shows that in the absence of information production, divestment may succeed or fail depending on the strength of the supermajority requirement κ, the institution size δ, and the shape of the density of the distribution f of productivity parameter.

Proposition 2. *[**Non informative divestment**] Assume that divestment does not produce any information ($\Phi_1 = \Phi_0$ or equivalently, $\lambda = 1/2$) and therefore all voters in both poll have the same belief about the harm state $\pi_2 = \pi_2^M = \pi_0$. The stakeholder with median harm-loss parameter g^m is a critical citizen for the divestment vote. If the institution divests (resp. forgoes divestment), the critical voter for stranding has the harm loss parameter $g^{c,1} = q_{\kappa,\delta}$ (resp. $g^{c,0} = q_\kappa$). Divestment receives majority support from the institutional stakeholders if and only if*

$$0 < \Delta_d u_{m1} = \pi_0^2 \int_{q_\kappa}^{q_{\kappa,\delta}} (g^m - g) f(\pi_0 g) dg \tag{22}$$

where we recall that q_κ and $q_{\kappa,\delta}$ are the quantiles defined in equation (3) and where $\Delta_d u_{m1}$ is defined in equation (16) and represents the difference between the median stakeholder's expected utility when the institution divests relative to when divestment is forgone.

The first result of Proposition 2 is to observe that the critical citizen for the divestment decision is the stakeholder with median harm-loss parameter g^m. Since the heterogeneity parameter g_i is single dimensional, preferences are linear in that parameter and, voters face a binary choice ruled by majority voting, the median voter theorem holds and as a result, the critical voter for the divestment decision is the median voter.

From the point of view of the stakeholder with median harm-loss parameter g^m, divesting is similar to handing the critical voter status for stranding to another citizen who has a different harm-loss parameter. If the institution divests, the critical citizen for the strand vote has the harm-loss parameter $g^{c,1} = q_{\kappa,\delta}$. If the institution forgoes divestment, the critical citizen for the strand vote becomes the citizen with a harm-loss parameter $g^{c,0}$ defined in equation (19). Since the divestment campaign is uninformative, substituting $\pi_2 = \pi_2^M$ in equation (19) gives $g^{c,0} = q_\kappa$.

The change of identity of the critical citizen for the strand vote can generate a negative externality on the median voter g^m at the divestment stage because the preferred stranding policy of the median voter in general differs from the preferred stranding policy of other citizens. For the median stakeholder, both divesting and not divesting are second best choices and inequality (22) says that the median voter's difference in expected utility when divesting relative to not divesting ($\Delta_{\mathrm{d}}\, u_{m1}$) is non-negative.

When the institution forgoes divestment, asset stranding can be too difficult to achieve from the perspective of the stakeholder with median harm-loss parameter. This is because the supermajority rule, $\kappa \geq 1/2$, is more demanding than the simple majority rule. Equivalently, the critical voters' harm-loss parameters for the two polls are ranked $g^{c,0} = q_\kappa < g^m$. Divestment can then serve as a device for the median stakeholder to weaken the required supermajority support for stranding. When the super-majority requirement is large, $\kappa \geq 1/2 + \delta/2$, it can be shown that the median voter's harm-loss is larger than the harm-loss of the critical citizen both when divestment succeeds and when it fails:

$$q_\kappa < q_{\kappa,\delta} \leq g^m. \tag{23}$$

In that case, the region of productivity where there is disagreement between the first best policy and the second best policy is larger when divestment is defeated than it is when divestment succeeds. If inequality (22) holds then for any distribution of the productivity, $g^m \geq g$ for any $g \in [g^{c,0}, g^{c,1}]$. The median voter therefore divests regardless of information about externalities, in order to move the critical voter for the strand vote closer to her own position.

When the super-majority requirement is low, $\kappa < 1/2 + \delta/2$, it can be shown that the critical citizen for stranding when divestment succeeds has a larger harm-loss parameter than that of the median voter:

$$q_\kappa < g^m < q_{\kappa,\delta}. \tag{24}$$

Either divesting or not divesting are second-best choices for the median voter, but the two choices induce two non-overlapping regions of disagreement with the median voter on the stranding policy. From the perspective of the median stakeholder, stranding occurs too frequently after divesting and too infrequently if divestment if forgone. Stated otherwise, the median voter selects a strictly supermajority rule for stranding when forgoing divesting and a strictly submajority rule when divesting. The dominating divestment decision is the one that gives the largest expected utility to the median voter. The shape of the density of the distribution of productivity will determine whether divestment receives the support of the median voter and hence of a majority of stakeholders as described in inequality (22).

Figure 2 illustrates the regions of divestment according to the parameters (δ, κ), for three different exponential distributions of productivity, with densities $f(x) = \alpha e^{-\alpha x}$ for $\alpha = 1,\ 5,\ 10$. The green region is the region of divestment and the red region is the region where divestment if defeated. In each panel we also plot the dashed line defined by the equation $\kappa = 1/2 + \delta/2$. One the dashed line, it can be verified that inequality (22) is satisfied and therefore divestment always receives majority support in the upper region of the dashed line regardless of the distribution of productivity. Broadly speaking the three panels of Figure 1 show that divestment receives majority support when κ is large and δ is small. This illustrates the intuition that when the super-majority threshold is large, divestment is an effective way to weaken the supemajority requirement and make the harm loss parameter of the strand vote critical voter closer to that of the median harm-loss. The frontier of the red region and the green region is non-linear and depends on the distribution of productivity as well as on the distribution of externality parameter. When the parameter of the exponential distribution grows, the green region where divestment receives majority support expands.

3.3 Informative divestment and pure strategy equilibria

We now allow that divestment is informative and study pure strategy equilibria. The institution produces a signal with informativeness $\lambda \in (1/2, 1]$. To simplify the presentation of the results and without loss of generality, we assume for the rest of the paper a symmetric prior for the externality state:

Assumption 1. *The prior for the externality state is uniform, $\pi_0 = 1/2$, so that $\underline{\pi}/\overline{\pi} = (1-\lambda)/\lambda$.*

When divestment induces information production, the median voter g^m needs to consider, in a addition to the political channel, an informational channel. Divestment now can reveal to outsiders the information produced by the institution. The median stakeholder therefore must assess the informational implication of the divestment decision on the stranding policy and on their expected utility.

We show that, depending on parameters, pure-strategy equilibria can exist that are fully revealing (separating) or uninformative (pooling). In a fully-revealing equilibrium, the institution divests if and only if the $(\pi_1 = \overline{\pi})$, that is when stakeholders revise upwardly their belief on the externality. In an uninformative pooling equilibrium, the divestment outcome is the same regardless of the signal, and outsiders cannot learn from the divestment decision. Pooling equilibria can exist in which the institution never divests, or always divests.

3.3.1 Fully revealing political equilibrium

Because the median voter theorem holds at both the divestment and stranding polls, the divestment/strand policies are the preferred policy of the critical voters of both polls. The critical voter for the strand poll assumes that a fully revealing equilibrium holds and form his posterior on the basis of this assumption: when the institution divests, the market beliefs become $\pi_2^M = \overline{\pi}$ and when the institution forgoes divestment, $\pi_2^M = \underline{\pi}$. The median stakeholder also assumes that a fully revealing equilibrium holds and, on this basis, decides the divestment policy optimally. Establishing the existence of a fully revealing equilibrium is tantamount to proving that the optimal divestment behaviour of the median stakeholder is indeed to divest if and only if the information about the externality is negative $(\sigma = 1)$. In a first step, we provide in the following lemma the expression of the expected utility of the median stakeholder on the basis of which the divestment vote is made. For notational convenience, we denote for any $d \in \{0, 1\}$, the harm-loss parameter of the critical voter of the strand vote in our fully revealing equilibrium (or separating equilibrium) by $\overline{g}_{\mathcal{S}}^{c,d}$ when $\sigma = 1$ and by $\underline{g}_{\mathcal{S}}^{c,d}$ when $\sigma = 0$. For example, $\overline{g}_{\mathcal{S}}^{c,1}$ is the strand vote critical voter's when the institution divests $(d = 1)$ and the news about the externality is negative $\sigma = 1$.

Lemma 1. ***[Expected utility of the median stakeholder at the divestment stage]***

Assume that divestment reveals to all citizen the information produced by the institution. When the information about the externality is positive $(\sigma = 0)$, the critical voter for stranding has the posterior $\pi_2^M = \underline{\pi}$ (resp. $\pi_2^M = \overline{\pi}$) and the harm-loss parameter $\underline{g}_{\mathcal{R}}^{c,0} = q_\kappa$ (resp. $\underline{g}_{\mathcal{R}}^{c,1} = q_{\kappa,\delta}$) when $d = 0$ (resp. $d = 1$). Consequently, the difference in the median stakeholder's expected utility conditional on receiving good information on the externality, between divesting and not divesting is given by

$$\underline{\Delta}_d^{\mathcal{R}} u_{m1} := u_{m1}(d = 1, \sigma = 0) - u_{m1}(d = 0, \sigma = 0) = \underline{\pi}^2 \int_{q_\kappa}^{\frac{\lambda}{1-\lambda} q_{\kappa,\delta}} (g^m - g)\, f(\underline{\pi} g) dg. \quad (25)$$

When the information about the externality is negative ($\sigma = 1$), the critical voter for stranding has the posterior $\pi_2^M = \overline{\pi}$ and the harm-loss parameter $\overline{g}_{\mathcal{R}}^{c,1} = q_{\kappa,\delta}$ when divestment receives majority support from the stakeholders. Alternatively when divestment is forgone by the institution, the critical voter for stranding has the posterior $\pi_2^M = \underline{\pi}$ and the harm loss parameter $\overline{g}_{\mathcal{R}}^{c,0}$ that solves equation (19) with the substitution $\pi_2^M = \underline{\pi}$ and $\pi_2 = \overline{\pi}$.

The difference in the median stakeholder's expected utility conditional on receiving good information on the externality, between divesting and not divesting is given by

$$\overline{\Delta}_d^{\mathcal{R}} u_{m1} := u_{m1}(d = 1, \sigma = 1) - u_{m1}(d = 0, \sigma = 1) = \overline{\pi}^2 \int_{\frac{1-\lambda}{\lambda}\overline{g}_{\mathcal{R}}^{c,0}}^{q_{\kappa,\delta}} (g^m - g)\, f(\overline{\pi} g) dg. \qquad (26)$$

We now characterise the existence of a fully revealing equilibrium in the next proposition.

Proposition 3. *[**Characterization of the fully revealing rational expectation political equilibrium.**] There exists a fully revealing equilibrium where divestment receives majority support among institution stakeholders if and only if*

$$\overline{\Delta}_d^{\mathcal{R}} u_{m1} > 0, \quad and, \quad \underline{\Delta}_d^{\mathcal{R}} u_{m1} \leq 0 \qquad (27)$$

In equilibrium, the critical voter for stranding has a harm-loss parameter $q_{\kappa,\delta}$ (resp. q_κ) and the cash flow threshold for stranding is $\overline{\pi} q_{\kappa,\delta}$ (resp. $\underline{\pi} q_\kappa$) when $\sigma = 1$ (resp. $\sigma = 0$).

Assume that when the signal is perfectly informative ($\lambda = 1$), divestment receives majority support when it transmits the institutional information to the remaining population

$$\lim_{\lambda \uparrow 1} \overline{\Delta}_d^{\mathcal{R}} u_{m1} \equiv \int_0^{q_{\kappa,\delta}} (g^m - g) f(g) dg > 0. \qquad (28)$$

Then, there always exists an informativeness threshold $\lambda^* \in [1/2, 1]$, such that the conditions (27) hold and hence, a fully revealing equilibrium exists for any $\lambda \geq \lambda^*$.

To start our discussion of Proposition 3 recall that the stakeholder with median harm-loss parameter g^m acts as a dictator for the divestment decision. The median stakeholder utilizes the divestment decision aware that: 1) communicate information to outsiders through the divestiture vote can inform outsiders, and 2) divesting can mitigate the distortion created by the supermajority rule for stranding relative to the majority rule that applies to divestment. The left inequality of (27) requires that when the information about the externality is negative, $\sigma = 1$, the median voter prefers to divest. The right inequality of (27) says that when the information about the externality is positive, $\sigma = 0$, the median voter prefers to forgo divestment. Finally, when inequality (28) holds, Proposition 3 shows that there always exists a threshold of informativeness $\lambda^* \in [1/2, 1]$ such that when the underlying institutional signal satisfies $(\lambda > \lambda^*)$ a separating equilibrium exists. This is intuitive because when the signal is informative, the distortion of the strand vote due to beliefs misrepresentation is too large and as a result, it is better to take the divestment decision that reveals the information that was produced by the institution.

3.3.2 Pooling equilibria

In a pooling equilibrium, the institution outsiders do not learn from the divestment decision because the divestment decision does not depend on whether the news about the externality is positive or negative. This implies that the institution outsiders' posterior of the externality state is $\pi_2^M = \pi_0$ notwithstanding whether $\sigma = 0$ or $\sigma = 1$. In the following proposition, we characterize the existence of a pooling equilibrium.

Proposition 4. *[* ***Characterization of the pooling rational expectation political equilibrium.*** *] Denoting by $\overline{\Delta}_d^{\mathcal{P}} u_{m1}$ (resp. $\underline{\Delta}_d^{\mathcal{P}} u_{m1}$) the difference in the median stakeholder's expected utility conditional on $\sigma = 1$ (resp. $\sigma = 1$), between divesting and not divesting, we have*

$$\overline{\Delta}_d^{\mathcal{P}} u_{m1} = \overline{\pi}^2 \int_{\frac{1}{2\lambda}\overline{g}_{\mathcal{P}}^{c,0}}^{\frac{1}{2\lambda}q_{\kappa,\delta}} (g^m - g)\, f(\overline{\pi} g) dg, \quad \underline{\Delta}_d^{\mathcal{P}} u_{m1} = \underline{\pi}^2 \int_{\frac{1}{2\lambda}\underline{g}_{\mathcal{P}}^{c,0}}^{\frac{1}{2\lambda}q_{\kappa,\delta}} (g^m - g)\, f(\underline{\pi} g) dg$$

where the harm-loss parameters $\overline{g}_{\mathcal{P}}^{c,0}$ solves equation (19) with the substitution $\pi_2^M = \pi_0 \equiv 1/2$ and $\pi_2 = \overline{\pi}$. and where the harm-loss parameter $\underline{g}_{\mathcal{P}}^{c,0}$ solves equation (19) with the substitution $\pi_2^M = \pi_0 \equiv 1/2$ and $\pi_2 = \underline{\pi}$.

There exists a pooling equilibrium where the institution either divest or forgoes divestment for both values of the signal $\sigma = 0, 1$ if and only

$$\overline{\Delta}_d^{\mathcal{P}} u_{m1} \cdot \underline{\Delta}_d^{\mathcal{P}} u_{m1} > 0. \tag{29}$$

Condition (29) is necessary and sufficient for the existence of a pooling equilibrium and shows that there are two types of pooling equilibrium. Due to the absence of learning, in both pooling equilibrium, the critical voter for the strand vote has the posterior $\pi_2^M = \pi_0$ in both types of equilibria. The first type of equilibrium is a divestment pooling equilibrium where $\overline{\Delta}_d^{\mathcal{P}} u_{m1} > 0$ and $\underline{\Delta}_d^{\mathcal{P}} u_{m1} > 0$. In a divestment pooling equilibrium, the critical voter for stranding has the harm-loss parameter $\overline{g}_{\mathcal{P}}^{c,1} = \underline{g}_{\mathcal{P}}^{c,1} = q_{\kappa,\delta}$ and the stranding policy productivity threshold is $\pi_0 q_{\kappa,\delta}$ and is insensitive to the signal σ. The second type of equilibrium is a no divestment pooling equilibrium is one where $\overline{\Delta}_d^{\mathcal{P}} u_{m1} < 0$ and $\underline{\Delta}_d^{\mathcal{P}} u_{m1} < 0$. In a no divestment pooling equilibrium the critical voter for stranding the harm-loss parameter $\overline{g}_{\mathcal{P}}^{c,0}$ (resp. $\underline{g}_{\mathcal{P}}^{c,0}$) when $\sigma = 1$ (resp. $\sigma = 0$) and the stranding policy productivity threshold is $\pi_0 \overline{g}_{\mathcal{P}}^{c,0}$ when $\sigma = 1$ and $\pi_0 \underline{g}_{\mathcal{P}}^{c,0}$ when $\sigma = 0$.

Notice that the condition for the existence of a pooling equilibrium (29) does not exclude the condition for the existence of a fully revealing equilibrium (27). As we will see in the numerical illustration there are regions of the model's parameters $(\delta, \kappa, \lambda)$ where multiple pure-strategy equilibria exist.

3.3.3 Numerical illustration

Figure 3 shows the region of existence of the separating divestment equilibrium for different sets of parameters. We show variation along three key dimensions of the model through the parameters λ, the signal informativeness, κ, the (super)majority threshold for the strand vote, and δ, the size of the institution. Throughout the figure we hold constant the cumulative distribution H (externalities) as an exponential distribution with parameter $\alpha_h = 1$ and another cumulative F (harmful-asset productivity) is an exponential distribution with parameter $\alpha_f = 1$. The prior belief is set to $\pi_0 = 1/2$. The figure shows nine panels. The first, second, and third rows respectively fix the parameters λ, δ, and κ at low, medium, and high levels and show the regions of the separating equilibrium in the two-dimensional spaces of the unfixed parameters.

The first row of Figure 3 shows that as signal informativeness improves, the region of the separating equilibrium expands. When signal quality is very low (first column) the space of the separating equilibrium is negligible, and when signal quality is very high nearly the entire space of (κ, δ) supports the separating equilibrium. This is natural since a high signal quality incentivizes information revelation. Although the institutional insiders do not enjoy all of the benefits of improved social decision-making with respect to asset stranding, they are affected enough to care, and honestly divesting when information about externalities is bad can be supported. The second row varies δ. As δ increases, the region of separating equilibrium existence narrows and require higher values of κ to survive. This is because for a large institution, divestiture will turn a large mass of voters into committed asset stranders. This is desirable for the median voter in the divestiture vote when κ is large, because divestiture moves the critical voter in the strand vote higher in the distribution of externality exposures. However, when κ is small, close to or equal to one half, the median voter in the strand vote is more reluctant to see the critical voter in the strand vote move down, because this can move away from the median voter's own position.

The final row shows variation in κ, the supermajority threshold for the strand vote. For low values of κ, for example when $\kappa = 1/2$ is simple majority, informativeness λ must rise with institution size δ to sustain the separating equilibrium. This illustrates the tradeoff faced by the median voter. With a small institution size, divestiture barely has an affect on the critical voter in the strand vote. Since the median voter is the critical voter in the strand vote if no divestiture occurs, they prefer no stranding from the point of view of their closeness to the critical voter in the strand vote. When the institution size is small, the median voter loses little of their proximity to the critical voter in the strand vote, and any amount of information can persuade them to prefer separating in the divestiture vote. But for larger institution sizes δ, the median voter in the divestiture vote experiences a greater loss of position in the strand vote relative to the critical voter, and requires a more informative signal to compensate for their preferences being less represented in the strand vote. Thus, in our model divestiture provides a way for institutions to "break" a severe supermajority requirement in the strand vote, by generating a politically committed group of voters and moving the effective threshold requirement in the strand vote closer to the median voter in the divest vote. We are unaware of prior research that has explored how this kind of "voting on the next marginal voter" can become particularly interesting when the first stage vote has the possibility to soften a burdensome supermajority in the second stage.

Figure 4 illustrates pooling equilibria, which may be to never divest, or to always divest. The first row shows that the region of existence of pooling equilibria narrows as the informativeness of the signal increases. This is because when the signal is informative, it becomes more important to communicate information about externalities to outsiders. The second row shows that the region of pooling equilibria expands as the institution size δ increases. Moreover, the red region of existence of no-divestment pooling equilibria expands when δ increases. This is because when δ increases, the post-divestment critical voter for stranding moves up in the distribution of externality harm, away from the median externality harm, making divestment less attractive. The third row of Figure 4 shows that pooling on divestment is always an equilibrium when the strand vote is governed by a unanimity rule ($\kappa = 1$). This is because in this case, divestment will receive majority support because it help the median voter weakens the necessary political support to strand.

Figure 5 superposes Figures 3 and 4. The figure show that the regions of separating equilibria and that of pooling equilibria intersect. The yellow regions emerge in the three rows and represents the set of parameters under which two equilibria are possible. One of the two equilibria is a separating equilibrium and the other is a divestment pooling equilibrium.

4 Effects on Asset Stranding

In this section, we evaluate the performance of divestment as a mechanism to influence the probability of stranding. To do so, we consider a *benchmark model* that is identical to our model in every way, including the institution producing new information about the externality, with the exception that the institution by assumption *cannot* divest. This benchmark eliminates both the political and informational channels through which divestiture influences asset stranding in our model. The political channel is eliminated because without divestiture, all institutional stakeholders retain a stake in the harmful asset and thus in the strand vote must balance the expected utility they derive from harmful-asset cash flows. The informational channel is eliminated because while the institution still produces information, without divestiture the institution cannot credibly communicate its knowledge to outsiders.

To understand the effect of divestment on asset stranding, we compare the probability of asset stranding in our model with the benchmark model. We focus our analysis on comparison of the fully revealing equilibrium with the benchmark model. We compare probabilities of asset stranding conditional on divestment or no divestment, as well as the unconditional probability of stranding. The results are summarized in the following proposition.

Proposition 5. *[**Probability of stranding under different regimes.**] When the signal about the externality is negative, $\sigma = 1$, the probability of stranding in the fully revealing equilibrium denoted by $\mathbb{P}^{\mathcal{R}}(s = 1|\sigma = 1)$ and in the benchmark model denoted by $\mathbb{P}^{\mathcal{B}}(s = 1|\sigma = 1)$ are given by*

$$\mathbb{P}^{\mathcal{R}}(s = 1|\sigma = 1) = \int_0^{\overline{\pi} q_{\kappa,\delta}} f(a)da, \quad \mathbb{P}^{\mathcal{B}}(s = 1|\sigma = 1) = \int_0^{\pi_0 \overline{g}^{c,0}} f(a)da \tag{30}$$

where $\overline{g}^{c,0}$ *solves equation (19) with the substitution* $\pi_2^M = \pi_0$ *and* $\pi_2 = \overline{\pi}$*. When divestment succeeds, the critical voter for stranding has is the institution outsider with harm-loss parameter* $g^{c,1} = q_{\kappa,\delta}$ *defined in equation* (3)*. Similarly, the probability of stranding conditional on* $\sigma = 0$ *in the two models are given by*

$$\mathbb{P}^{\mathcal{R}}\left(s=1|\sigma=0\right) = \int_0^{\underline{\pi} q_\kappa} f(a)da, \quad \mathbb{P}^{\mathcal{B}}\left(s=1|\sigma=0\right) = \int_0^{\pi_0 \underline{g}^{c,0}} f(a)da \tag{31}$$

where $\underline{g}^{c,0}$ *solves equation (19) with the substitution* $\pi_2^M = \pi_0$ *and* $\pi_2 = \underline{\pi}$*.*

To visualize the impact of divestment we plot the change in the probability of stranding, for the fully revealing equilibrium less the benchmark model, using a heat map for all values of the parameters δ, κ, λ where the fully revealing equilibrium exists. We plot the change in the probability of strainding conditional on the signal $\sigma = 1$ (Figure 6), $\sigma = 0$ (Figure 7), and unconditionally (Figure 8).

In Figure 6, the conditional probability of stranding is always higher than in the benchmark model. This is because when we condition on the signal $\sigma = 1$ about large expected externalities, the institution divests, and through both the political channel and informational channels support for asset stranding at $t = 2$ increases relative to the benchmark model. Oppositely, in Figure 7 when we condition on $\sigma = 0$ and the institution not divesting, the probability of stranding falls relative to the benchmark model. We can see from the top right panel that support falls most for parameter configurations with large λ, and small δ and κ, where the informational channel in the separating equilibrium is large. The change in unconditional probability of stranding shown in Figure 8 balances the two conditional probabilities shown previously. Some parameter configurations increase the probability of stranding (top right portion of top right panel) and others decrease it (bottom left portion of top right panel). Dashed lines show parameter configurations that result in no change in the unconditional probability of asset stranding.

These results reflect the differing effects of the political and informational channels. To understand the pure effect of the political channel, consider pooling equilibria of the game where the institution always divests. These divestment pooling equilibria must increase the probability of asset stranding relative to the benchmark model, because there is no informational channel in pooling equilibria and the political channel unambiguously raises the strand probability. In the separating equilibria, shown in Figure 8, the political channel is strong relative to the informational channel when δ and κ are large, and when λ is small.

Correspondingly, in these regions (e.g., top right portion of top right panel, bottom left portion of bottom left panel) the unconditional probability of stranding increases relative to the benchmark model. The political channel raises the unconditional probability of stranding by reducing stakeholders' financial interest in the harmful asset.

The effect of the informational channel is different: the informational channel raises the strand probability when the expected externalities are high, but reduces the strand probability when expected externalities are low. The net effect on the unconditional probability of stranding is not analytically obvious, but in Figure 8 we can see that when the political channel is eliminated ($\delta = 0$, first panel in second row), the pure informational effect on stranding is to reduce the unconditional strand probability. Hence, the informational channel focuses on more efficient stranding, i.e., stranding when expected externalities are high, rather than simply increasing strand probabilities in all states of the world. Together, both political and informational channels are important to understanding why institutional divestment influences harmful-asset stranding.

5 Model Extensions

We show robustness of the divestment equilibrium to domestic purchase of divested shares and alternative signal structures. In this section we assume for simplicity simple majority rule at the strand vote ($\kappa = 1/2$).

5.1 Domestic purchase of divested shares

Previously, we assumed that foreign non-voting investors buy divested securities. This assumption gives maximum impact to divestment in term of ability to improve the political conditions for stranding. We now consider whether the divestment equilibrium is robust to assuming domestic purchase of divested shares.

We focus on a simple case, where the divested assets are uniformly purchased by the $1 - \delta$ population of citizens who are not institutional stakeholders. Everything else being held constant, increasing the assets' ownership decreases the incentives to vote for stranding for all citizens in the fringe $1 - \delta$. Divestment implies that some of these citizens may switch from voting for stranding to voting against it. Therefore, the political implication of the reallocated shares represents a countervailing force that may offset and may even be stronger than the conversions in reverse direction that divestment brings about in the population of institutional stakeholders. We can expect therefore that the new allocation rule for the divested shares will weaken the political channel of divestment that reinforces the support for stranding. The political cost of divesting is smaller for the median voter when deciding for divestment with the new allocation rule of the divested shares and thus, intuitively, the conditions for the existence of a fully revealing rational expectation political equilibrium will be weakened.

More formally, for any values of the state variables $a \in [0, \infty)$, $\pi_2 \in \{\pi_0, \underline{\pi}, \overline{\pi}\}$ and $d \in \{0, 1\}$, the total mass of voters supporting stranding with the new allocation rule of divested securities is given by

$$\tilde{m}(a, \pi_2, d) = \delta d + (1 - \delta d) \left[1 - H \left(\frac{a}{(1 - \delta d)\pi_2} \right) \right]. \tag{32}$$

To unpack the meaning of equation (32), assume divestment succeeds $d = 1$ and citizens have the common belief π_2. As in equation (18), the first term of the right hand side of equation (32) is the fraction δ of the total population who divest and vote for stranding because they have no cash flow disincentive associated with the stranding reform. The remaining population of size $1 - \delta$ cast their votes for reform by comparing the utility of leaving the industry in operation to the utility if it is shut down. Each citizen form the remaining population with disutility parameter g_i has the utility

$$u_i = -\pi_2 g_i + \left(1 + \frac{\delta}{1 - \delta} \right) a$$

since the per capita ownership of the asset has increased by the total share divested (δ) distributed uniformly to a population of mas $1 - \delta$. The stranding policy will then receive majority support if and only if $\tilde{m}(a, \pi_2, 1) \geq 1/2$ or equivalently, $a \leq \pi_2 \tilde{g}^{m_\delta}$ where

$$\tilde{g}^{m_\delta} = (1 - \delta) F^{-1} \left(\frac{1}{2(1 - \delta)} \right) \equiv (1 - \delta) g^{m_{\delta, 1/2}} \leq g^{m_{\delta, 1/2}}. \tag{33}$$

With the new allocation of divested securities, the citizen with disutility parameter $\tilde{g}^{m_\delta}$ emerges as a median voter for the stranding vote when divestment succeeds.

Assume now that an informative divestment campaign takes place at the institution level and follow the same steps from Subsection 3.3 when the divested securities are purchased by the fringe $1-\delta$ of voting citizens rather than by foreign non voting buyers.

Similarly to Proposition 3, the next proposition characterise the rational expectation political equilibrium with the new allocation rule of divested securities.

Proposition 6. *[**Fully revealing rational expectation political equilibrium with the new allocation rule of divested securities.**] When*

$$H\left((1-\delta)H^{-1}\left(\frac{1}{2(1-\delta)}\right)\right) \leq \frac{1}{2} \tag{34}$$

we have, $\tilde{g}^{m_\delta} < g^m < g^{m_{\delta,1/2}}$ and we define the informativeness threshold λ_1^* as the unique solution of

$$\delta H\left((1-\delta)H^{-1}\left(\frac{1}{2(1-\delta)}\right)\right) + (1-\delta)H\left((1-\delta)\frac{\lambda_1^*}{1-\lambda_1^*}H^{-1}\left(\frac{1}{2(1-\delta)}\right)\right) = \frac{1}{2}. \tag{35}$$

If inequality (34) holds and if the signal produced by the institution is sufficiently informative, $\lambda > \lambda_1^*$, then we have $g^{m_\lambda} < \tilde{g}^{m_\delta} < g^m < g^{m_{\delta,1/2}}$ and, there exists an equilibrium where divestment occurs if and only if $\pi_1 = \overline{\pi}$.

Alternatively, when

$$H\left((1-\delta)H^{-1}\left(\frac{1}{2(1-\delta)}\right)\right) > \frac{1}{2} \tag{36}$$

we have, $g^{m_\lambda} < g^m < \tilde{g}^{m_\delta} < g^{m_{\delta,1/2}}$ for all $\lambda \in [0,1]$. Suppose, in addition, that the density of cash flows h satisfies the inequality

$$\int_{\overline{\pi}g^m}^{\overline{\pi}\tilde{g}^{m_\delta}} \left(z-\overline{\pi}g^m\right)f(z)dz < \int_0^{\overline{\pi}g^m} \left(\overline{\pi}g^m - z\right)f(z)dz, \tag{37}$$

and define the unique constant $\lambda_2^* \in (0,1)$ by

$$\int_{\overline{\pi}g^m}^{\overline{\pi}\tilde{g}^{m_\delta}} \left(z-\overline{\pi}g^m\right)f(z)dz = \int_{\overline{\pi}g^{m_{\lambda_2^*}}}^{\overline{\pi}g^m} \left(\overline{\pi}g^m - z\right)f(z)dz. \tag{38}$$

When inequalities (36) and (37) hold and the informativeness of the underlying signal produced by the institution is sufficiently large, $\lambda > \lambda_2^*$, there exists an equilibrium where divestment receives majority support from the institution stakeholders if and only if the information about the externality leads to the posterior $\pi_1 = \overline{\pi}$. In equilibrium, the stranding cash flow threshold is $\tilde{z}_{m_\delta} = \overline{\pi}\tilde{g}^{m_\delta}$ (resp. $\underline{\pi}g^m$) if $\pi_1 = \overline{\pi}$ (resp. if $\pi_1 = \underline{\pi}$).

The political channel of divestment converts voters on stranding in both directions with the new allocation rule of divested securities. Some of the institutions stakeholders convert to reform supporters because they have no economic exposure to the industry assets, while some other citizen from the fringe $1-\delta$ of the remaining population covert to reform opponents because of their increased exposure to the industry assets.

Proposition 6 shows that when inequality (34) holds, the second effect dominates and as a result, divestment reduces the support for the stranding reform relative to a vote where there is no divestment. When this happens, both divesting and not divesting weaken the support for the stranding when the news about the externality is negative. To have an equilibrium where divestment reveals the negative news $\pi_1 = \overline{\pi}$, we need the disutility of the median voter for stranding after divestment ($\tilde{g}^{m_\delta}$) to be closer to the first best median voter disutility (g^m) than the disutility median voter for stranding if divestment is defeated (g^{m_λ}). Proposition 6 shows that this happens when the signal produced by the institution is sufficient informative, that is, $\lambda > \lambda_1^*$, where λ_1^* is defined by equation (35). This is intuitive because when the signal is informative it becomes more costly for the median voter for divestment to misrepresent her information to the remaining population of citizen by rejecting divestment.

Proposition 6 also shows that when inequality (36) holds, the overall effect of divestment is still to increase the support for the stranding reform relative to a vote where there is no divestment. In that case, we have $g^{m_\lambda} < g^m < \tilde{g}^{m_\delta} < g^{m_{\delta,1/2}}$ so that the support for the reform subsequent to divestment is positive but weaker than the support result from our benchmark allocation rule where foreign non voting investors purchase the divested securities. In this subcase, the equilibrium condition will require that the utility loss of divestment are less severe than the utility loss of not divesting and misrepresenting the negative information about the externality. The situation is then very similar to the framework of Proposition 3. Condition (37) characterizes the existence of a fully revealing equilibrium where divestment happens only when $\pi_1 = \overline{\pi}$. Because $g^m < \tilde{g}^{m_\delta} < g^{m_{\delta,1/2}}$ divestment is a better second best with the new allocation rule of divested securities and as a result, condition (37) is less stringent that the condition characterizing the equilibrium with the benchmark allocation rule of divested securities.

This subsection shows that the divestment equilibrium is robust to uniform purchase of divested shares by domestic citizens who are not institutional stakeholders.

5.2 Alternative information structures

In this subsection, we broaden the scope of the information that the institution can produce. We focus on the case where the institution produces a continuous signal about the externality state and find a partially revealing rational expectation equilibrium where the divestment vote communicates a coarse summary of the institutional signal to the remaining population. The equilibrium is based on a threshold strategy on the value of the signal such that divestment happens if and only if the signal about the state is more negative than the threshold.

We assume the institution produces a continuous signal σ about the harm state ω. Each realization of the signal yields the posterior $\pi(\sigma) = \mathbb{E}(\omega = 1|\sigma)$. Assuming without loss of generality that the prior belief about the state is $\pi_0 = 1/2$, we model directly the distribution of posteriors as a uniform distribution over $[0, 1]$.[20]

A partially revealing rational expectation political equilibrium is threshold $\pi^* \in (0, 1)$ such that divestment receives majority support if and only if $\pi(\sigma) \geq \pi^*$. As in the preceding section, we proceed by verifying that if all citizen expect the existence of such an equilibrium when they vote for stranding, then the divestment will indeed be supported by a majority of institution stakeholders if and only if the signal produced by the institution satisfies $\pi(\sigma) \geq \pi^*$.

Observe first that is divestment takes place, the posterior belief of any citizen from the fringe $1 - \delta$ is $\pi_1 = \overline{\pi}^* := \mathbb{E}[\pi(\sigma)|\pi(\sigma) > \pi^*] = \frac{1+\pi^*}{2}$. Similarly, if divestment is defeated, the posterior belief of any citizen from the fringe $1 - \delta$ is $\pi_1 = \underline{\pi}^* := \mathbb{E}[\pi(\sigma)|\pi(\sigma) \leq \pi^*] = \frac{\pi^*}{2}$. Therefore, when voting for stranding the citizen from the fringe $1 - \delta$ will almost surely hold a belief that is distinct from the beliefs of the institution stakeholders. The next proposition, provides conditions under which a partially revealing rational expectation political equilibrium exists.

Proposition 7. *[* ***Partially revealing rational expectation political equilibrium with a continuous signal.*** *] When the institution produces an information leading to the posterior belief $\pi \in [0, 1]$ for the stakeholders and that divestment is defeated so that the remaining citizen infer that $\pi_1 = \underline{\pi}^*$; the median voter for the stranding vote has the belief*

[20] Any distribution on beliefs satisfying the "Bayes plausibility" condition $\mathbb{E}(\pi(\sigma)) = \pi_0$ can be recovered as distribution of posteriors for a given set of signals. It can be verified that the uniform distribution that we assume can be obtained as the distribution of posteriors from the triangular signal distribution with conditional densities $l(\sigma|\omega = 1) = 2\sigma$ and $l(\sigma|\omega = 0) = 2 - 2\sigma$ for $\sigma \in [0, 1]$.

$\pi_1 = \underline{\pi}^*$ *and the preference parameter* $g^{m_{\pi,\pi^*}}$ *defined as the unique solution to the equation*

$$\delta H\left(\frac{\underline{\pi}^*}{\pi} g^{m_{\pi,\pi^*}}\right) + (1-\delta) H\left(g^{m_{\pi,\pi^*}}\right) = \frac{1}{2}.$$

The threshold π^* *is a partially revealing rational expectation political equilibrium if and only if the function defined by*

$$\varphi(\pi, \pi^*) = \int_{\underline{\pi}^* g^{m_{\pi,\pi^*}}}^{\overline{\pi}^* g^{m_{\delta,1/2}}} (\pi g^m - z) f(z) dz$$

satisfies

$$\varphi(\pi, \pi^*) \begin{cases} \leq 0 & \textit{when} \quad \pi < \pi^*; \\ \geq 0 & \textit{when} \quad \pi \geq \pi^*. \end{cases} \tag{39}$$

In equilibrium, the stranding cash flow threshold is $\overline{\pi}^* g^{m_{\delta,1/2}}$ *(resp.* $\underline{\pi}^* g^{m_{\pi^*,\pi^*}}$*) if the signal produced by the institution yields the posterior* $\pi(s) \geq \pi^*$ *(resp.* $\pi(s) < \pi^*$*) and the security prices at* $t = 1$ *is given by*

$$P_1(\pi) = \begin{cases} \int_{\overline{\pi}^* g^{m_{\delta,1/2}}}^{\infty} z f(z) dz & \textit{when} \quad \pi \geq \pi^*; \\ \int_{\underline{\pi}^* g^{m_{\pi,\pi^*}}}^{\infty} z f(z) dz & \textit{when} \quad \pi < \pi^*. \end{cases} \tag{40}$$

In the proof of Proposition 7, we show that the function $\varphi(\pi, \pi^*)$ is the difference of expected utility when divestment succeeds relative to when divestment is defeated, for the median stakeholder with preferences parameter g^m. Since the median voter preferred policy is the policy that receives majority support for the divestment vote, condition (39) verifies that the divestment takes place if and only if $\pi > \pi^*$ consistent with out assumption on the equilibrium divestment decision. Proposition 7 suggests a numerical procedure to find the equilibrium threshold $\pi^* \in (0, 1)$ as a solution of the nonlinear equation

$$\varphi(\pi^*, \pi^*) \equiv \int_{\frac{\pi^*}{2} g^{m_*}}^{\frac{1+\pi^*}{2} g^{m_{\delta,1/2}}} (\pi^* g^m - z) h(z) dz = 0 \tag{41}$$

where g^{m_*} is independent of π^* and is the unique solution of the equation $\delta H\left(\frac{1}{2} g^{m_*}\right) + (1 - \delta) H\left(g^{m_*}\right) = \frac{1}{2}$. If a solution to the equation (41) exists, then the condition of Proposition 7 can be verified on a case per case basis.

Other extensions beyond the institution producing a continuous signal about the harm state ω could include the institution producing information about the distribution of g, or about economic benefits a. We leave consideration of these extensions for future research.

6 Conclusion

We have developed a new theory of institutional divestment based on political and informational channels, where the collective action of the institution, determined by its stakeholders, can play a pivotal role in asset stranding. The political channel reflects that divestment reduces the incentives of *all* institutional stakeholders to oppose asset stranding. Stakeholders have a utility interest in the well-being of the institution, either for economic or ideological reasons, and divestiture weakens stakeholders' utility connection with the economic payoff of the harmful asset. The information channel reflects that institutions can generate specialized knowledge of different types, which in a separating or partially separating equilibrium becomes embedded in financial prices and influences the stranding preferences of all citizens through a novel financial feedback channel on political decisions.

We envision many fruitful question at the nexus of financial markets, politics, and institutions. We leave these topics for future research.

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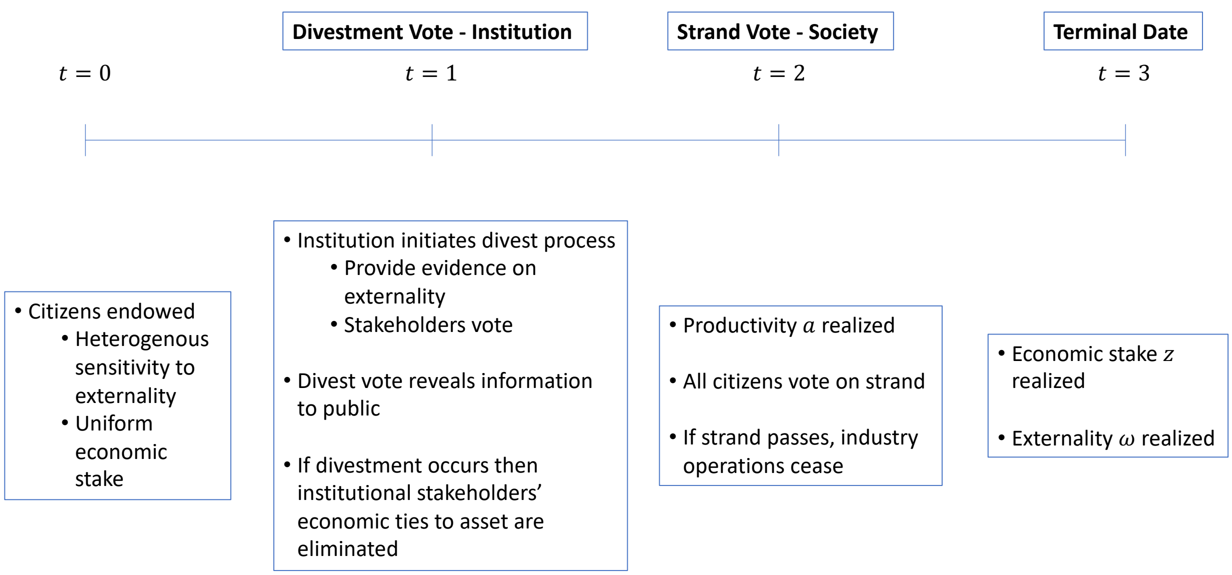

Figure 1: Model Timeline.

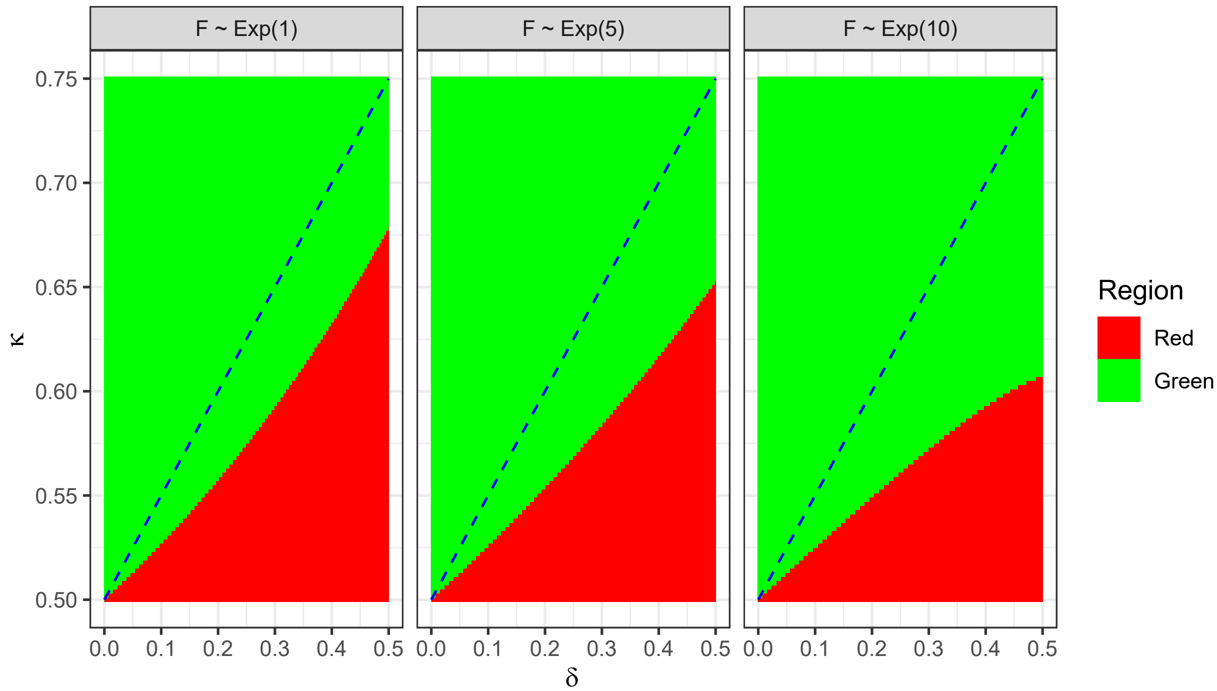

Figure 2: **Non informative divestment**. The green region in the plots indicates parameter combinations (δ, κ) where divestment receives majority support among stakeholders. In the red region, divestment is defeated. The dashes line solves the equation $\kappa = 1/2 + \delta/2$. The figure presents different panels by changing the parameter of the exponential distribution of the productivity. We assume a prior probability of the externality state $\pi_0 = 1/2$ and that the distribution of harm-loss is an exponential $h(g) = \alpha e^{-\alpha g}$ with $\alpha = 1$. The figure is truncated at $\kappa = 0.75$ because divestment always prevails in the region $0.75 \leq \kappa \leq 1$.

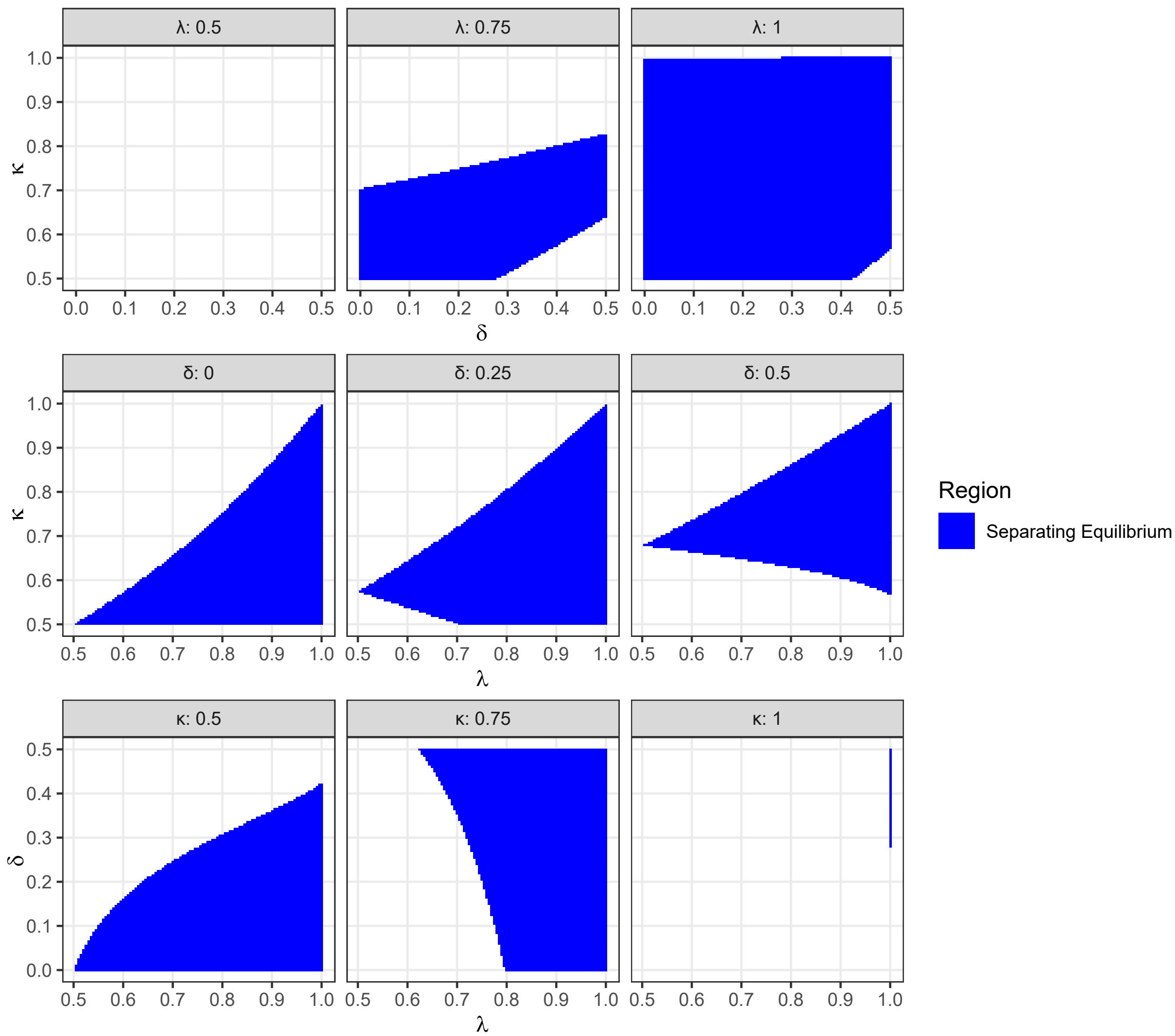

Figure 3: **Fully revealing political equilibrium**. The blue region in the plots indicates parameter combinations $(\delta, \kappa, \lambda)$ that are consistent with the fully revealing political equilibrium characterized in Proposition 3. We assume a prior probability of the externality state $\pi_0 = 1/2$ and that both the harm-loss parameter and the productivity are exponentially distributed $h(g) = e^{-g}$ and $f(a) = e^{-a}$.

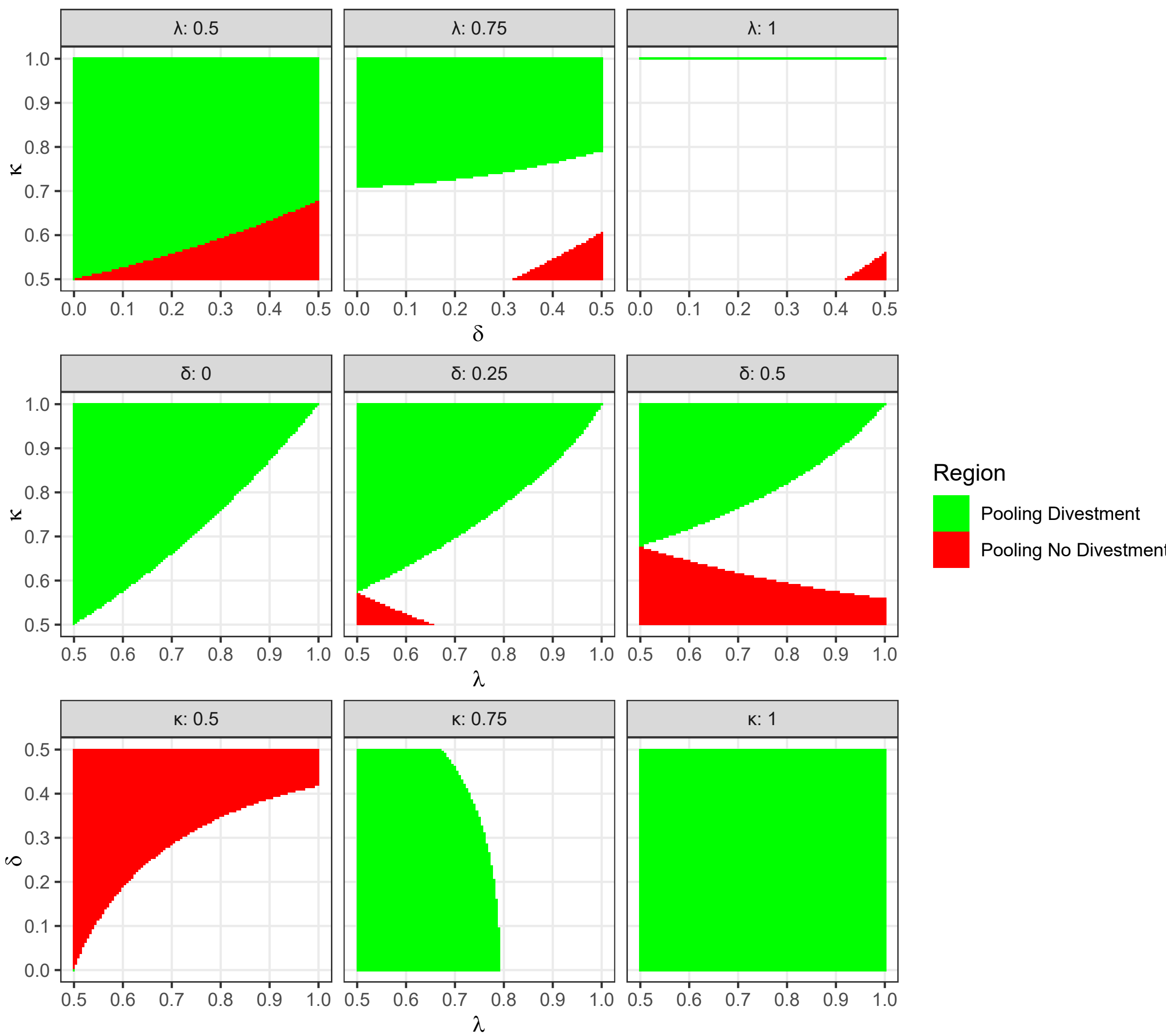

Figure 4: **Pooling political equilibrium**. The colored regions in the plots indicate parameter combinations $(\delta, \kappa, \lambda)$ that are consistent with a pooling equilibrium characterized in Proposition 4. The green color indicates the regions where a divestment pooling equilibrium holds and the red color indicates the regions where a no divestment pooling equilibrium holds. We assume a prior probability of the externality state $\pi_0 = 1/2$ and that both the harm-loss parameter and the productivity are exponentially distributed $h(g) = e^{-g}$ and $f(a) = e^{-a}$.

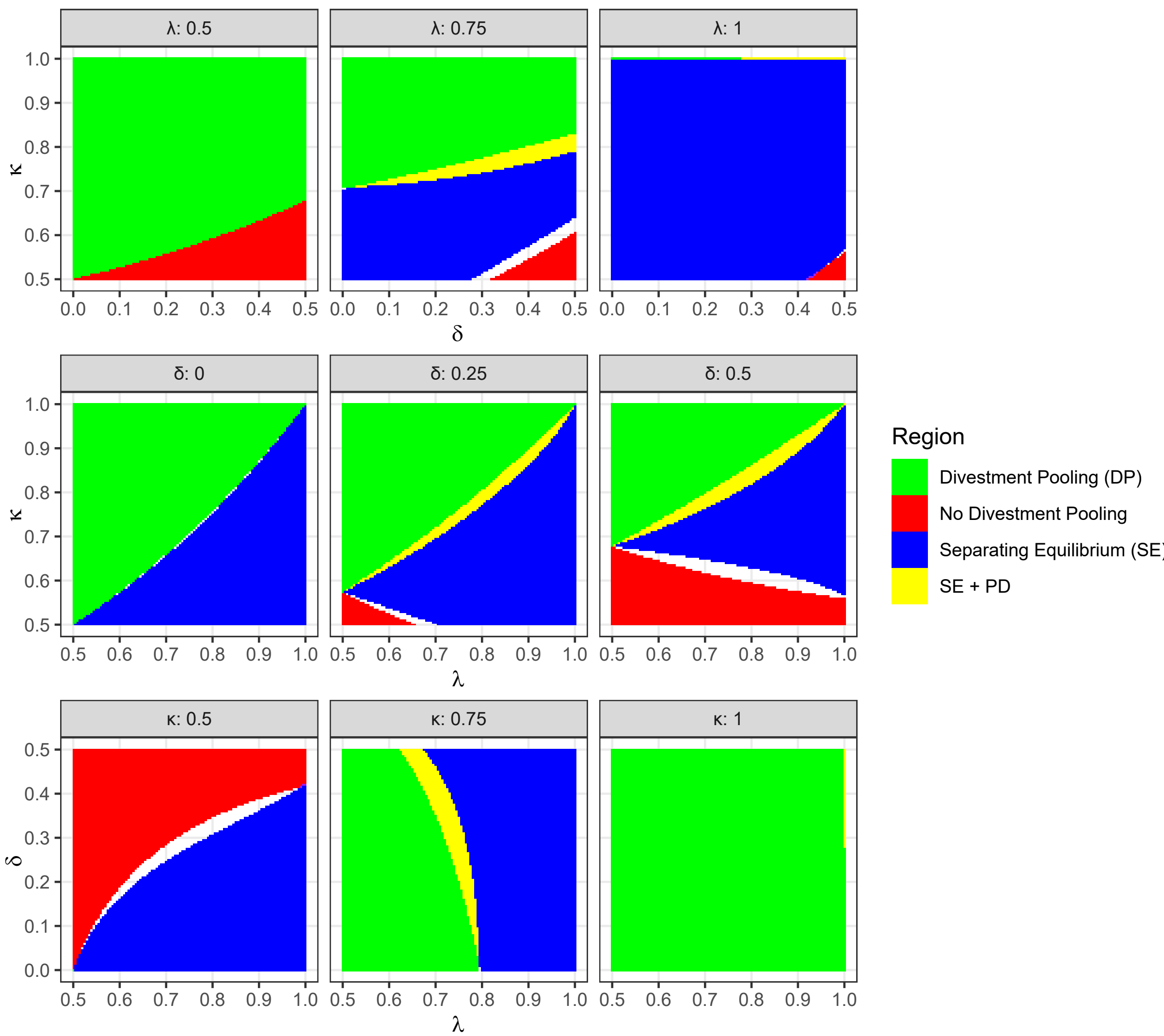

Figure 5: **All pure strategy equilibria**. The colored regions in the plots indicate parameter combinations $(\delta, \kappa, \lambda)$ that are consistent with a pooling equilibrium characterized in Proposition 4, the separating equilibrium characterized in Proposition 3. The green (resp. red) color indicates the regions where a pooling (resp. no) divestment equilibrium exists and no separating equilibrium holds. The blue color indicates the regions with a separating equilibrium can be sustained but no pooling equilibrium hold. The yellow color indicates the regions where we have two equilibria. The first equilibrium is a separating equilibrium and the second equilibrium is a divestment pooling equilibrium. The white color indicates regions where no equilibrium in pure strategies exist. We assume a prior probability of the externality state $\pi_0 = 1/2$ and that both the harm-loss parameter and the productivity are exponentially distributed $h(g) = e^{-g}$ and $f(a) = e^{-a}$.

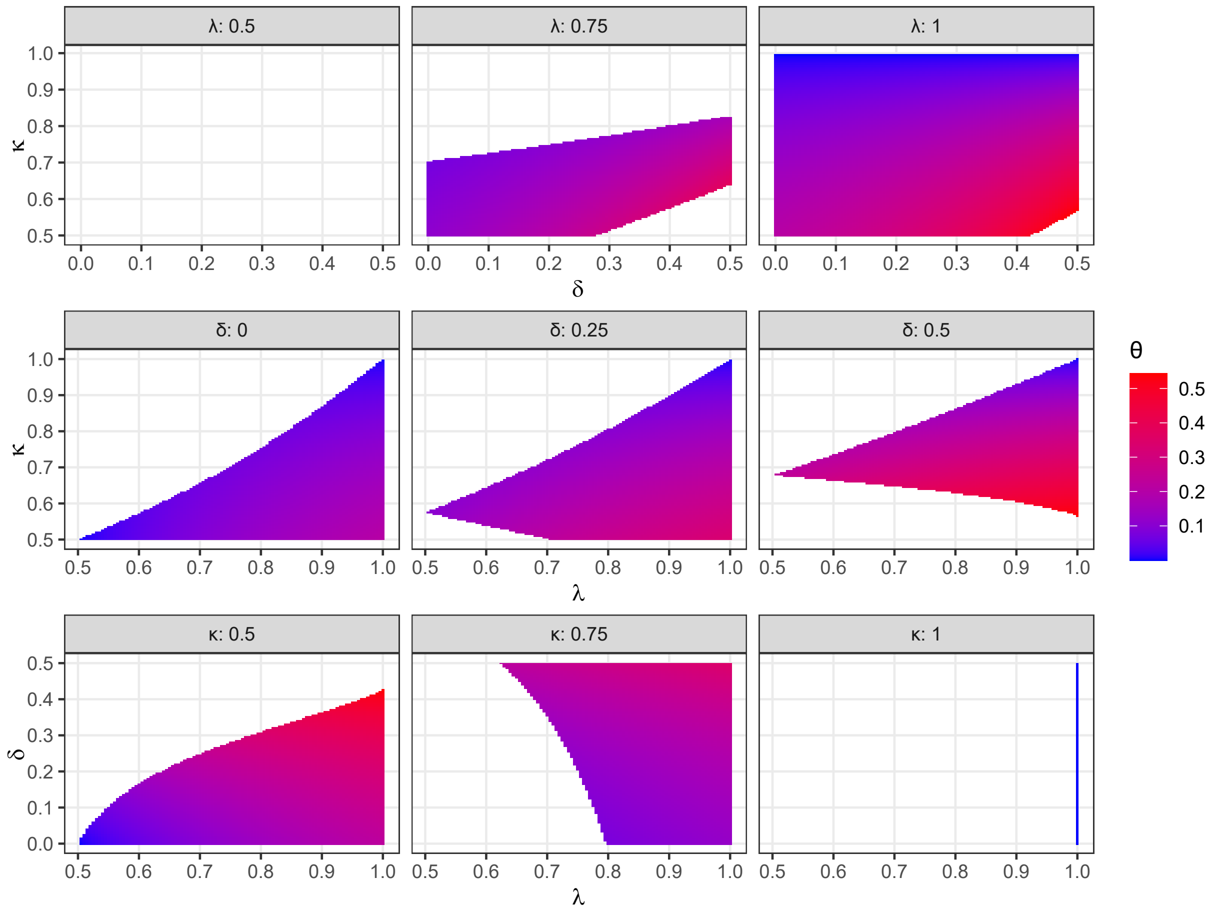

Figure 6: **Probability of stranding under different regimes conditional on** $\sigma = 1$. The figure presents a heat map the variable θ representing the change in the probability of stranding conditional on the value of signal $\sigma = 1$ between two regimes. The first regime is one where the institution by assumption cannot engage in divestment and where the information produced by the institution is not communicated to outsiders. The second regime is where divestment is possible and a separating equilibrium holds. We condition in this figure on the institution divesting. Formally, the variable θ is given by $\theta = \int_0^{\overline{\pi} q_{\kappa,\delta}} f(a)da - \int_0^{\pi_0 \overline{g}^{c,0}} f(a)da$ where we recall that $\overline{g}^{c,0}$ solves equation (19) with the substitution $\pi_2^M = \pi_0$ and $\pi_2 = \overline{\pi}$.

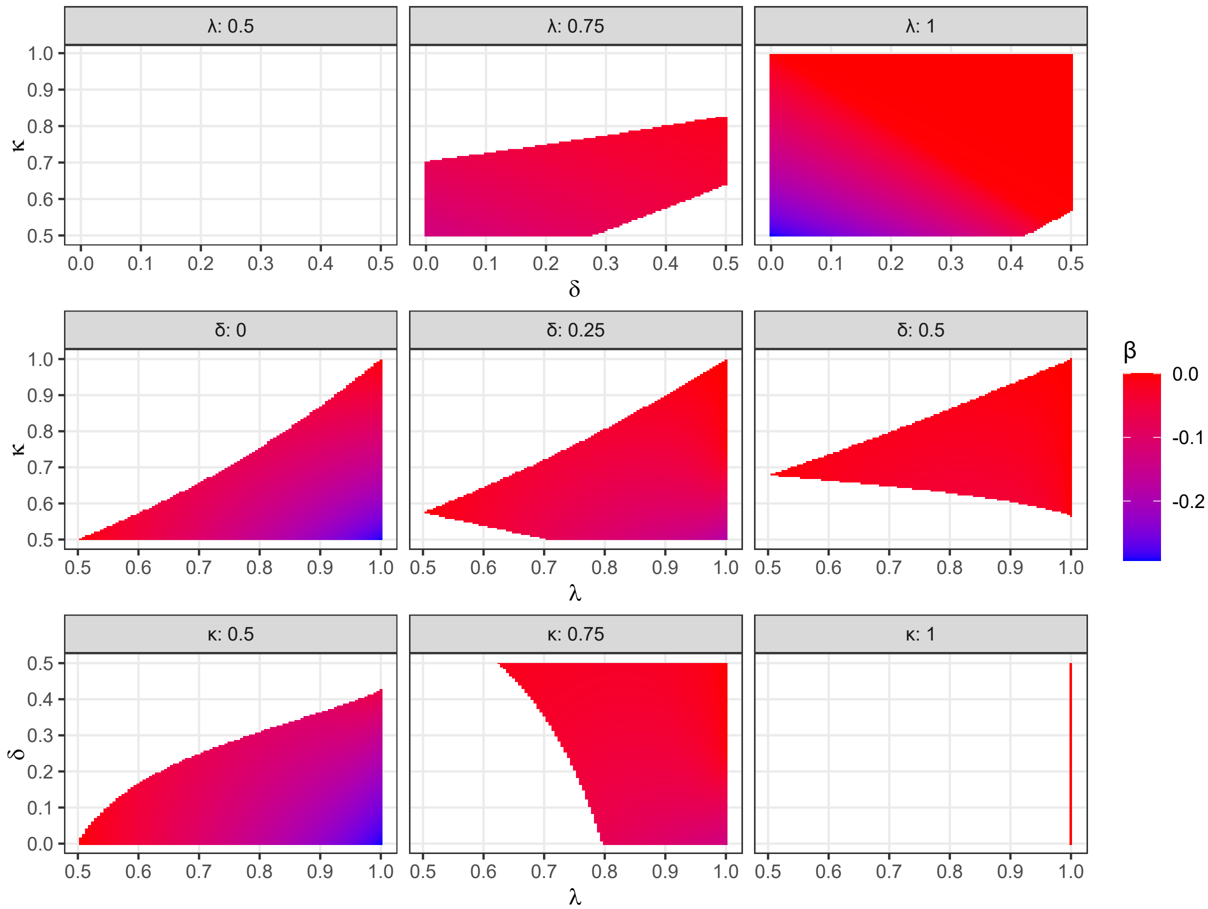

Figure 7: **Probability of stranding under different regimes conditional on** $\sigma = 0$. The figure presents a heat map the variable β representing the change in the probability of stranding conditional on the value of signal $\sigma = 0$ between two regimes. The first regime is one where the institution by assumption cannot engage in divestment and where the information produced by the institution is not communicated to outsiders. The second regime is one where divestment is possible and a separating equilibrium holds. We condition in this figure on the institution not divesting. Formally, the variable β is given by $\beta = \int_0^{\pi q_\kappa} f(a)da - \int_0^{\pi_0 \underline{g}^{c,0}} f(a)da$ where we recall that $\underline{g}^{c,0}$ where we recall that $\underline{g}^{c,0}$ solves equation (19) with the substitution $\pi_2^M = \pi_0$ and $\pi_2 = \underline{\pi}$.

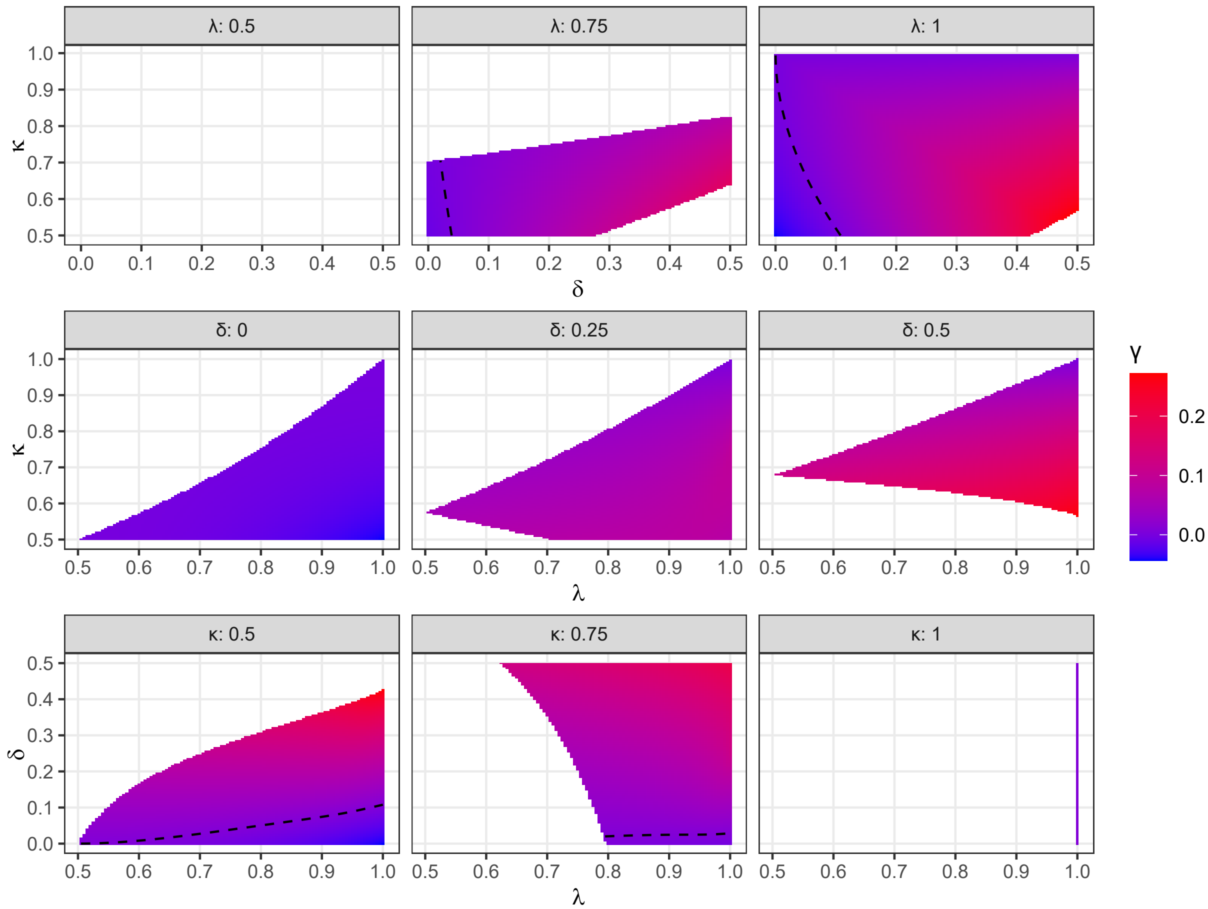

Figure 8: **Probability of stranding under different regimes prior to the realization of the signal σ.** The figure presents a heat map the variable γ denoting the change in the unconditional probability of stranding between two regimes. The first regime is a fully revealing rational expectation political equilibrium where the institution does not engage in divestment and where the information produced by the institution is not communicated to outsiders. The second regime is one where the information produced by the institution is communicated to the institution outsiders and the institution divests if and only if $\sigma = 1$. Formally, the variable γ is given by $\gamma = \mathbb{P}^{\mathcal{R}}(s = 1) - \mathbb{P}^{\mathcal{B}}(s = 1)$. The dashed black line represents the set $\gamma = 0$.