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Abstract

A failing firm employs domestic and foreign stakeholders. The latter have no voting rights. A politician decides on the vote-share maximizing bailout. In a probabilistic voting model, I analyze whether foreign stakeholders impact bailouts. Stakeholder voters shade their vote to reward the politician, while non-stakeholder voters punish the politician for imposing bailout-financing taxes. If foreign stakeholders neither pay taxes nor receive bailouts (seasonal workers), only voters at the firm level matter. Firms with equally large stakeholder groups receive distinct bailouts in equilibrium, depending on their voter-concentration among stakeholders. If foreigners pay taxes and receive bailouts (greencard holders), they impact the electorate and thus bailouts through monetary transfers despite their lack of voting rights. Then adding foreigners can both increase or decrease bailouts. The measure of all firm stakeholders remains insufficient to determine bailouts. In either case, vote-share maximizing bailouts equal socially optimal bailouts only if all stakeholders are domestic.

JEL Classification: G3, P16, D72

Keywords: Bailouts, political economy, Economic voting, Probabilistic voting, vote-share maximization, Too-big-to-fail, labor migration, socially optimal bailouts

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On the (Ir)relevance of Firm Size for Bail-outs under Voter-Neutrality: The Case of Foreign Stakeholders

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November 30, 2020

Abstract

A failing firm employs domestic and foreign stakeholders. The latter have no voting rights. A politician decides on the vote-share maximizing bailout. In a probabilistic voting model, I analyze whether foreign stakeholders impact bailouts. Stakeholder voters shade their vote to reward the politician, while non-stakeholder voters punish the politician for imposing bailout-financing taxes. If foreign stakeholders neither pay taxes nor receive bailouts (seasonal workers), only voters at the firm level matter. Firms with equally large stakeholder groups receive distinct bailouts in equilibrium, depending on their voter-concentration among stakeholders. If foreigners pay taxes and receive bailouts (greencard holders), they impact the electorate and thus bailouts through monetary transfers despite their lack of voting rights. Then adding foreigners can both increase or decrease bailouts. The measure of all firm stakeholders remains insufficient to determine bailouts. In either case, vote-share maximizing bailouts equal socially optimal bailouts only if all stakeholders are domestic.

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1 Motivation

A large literature in finance is concerned with the analysis of a socially optimal bailout provision to firms in the event of failure (Keister and Mitkov, 2016; Chari and Kehoe, 2016; Keister, 2015; Bianchi, 2012; Farhi and Tirole, 2012; Keister and Narasiman, 2016; Dewatripont and Tirole, 2018) or explains bailouts as the outcome of a too-big-to-fail (TBTF) problem (Freixas et al., 1999; Allen and Gale, 2000; Strahan, 2013; Acharya and Yorulmazer, 2007). Both literature strands emphasize that bailouts should increase, the more agents would suffer from the firm's default relative to the remaining population. In the real world, bailouts are, however, granted by politicians, and a politician's foremost objective is to make voters happy for winning elections. In a distinct literature strand on economic and probabilistic voting (Lindbeck and Weibull, 1987; Coughlin, 1992; Dixit and Londregan, 1996; Gavazza and Lizzeri, 2009; Acemoglu and Robinson, 2005; Persson and Tabellini, 2016), the extent to which a politician provides a public good (bailout) to a special interest group, i.e., the stakeholders of a failing firm, depends on the support and opposition the politician expects to generate via the bailout provision among his voters. A bailout generates support from the group of voters who would otherwise face losses but causes opposition from the group of remaining voters that is required to finance the bailout by paying taxes. Support and opposition manifest itself via economic voting (Anderson, 2007), i.e., positive respectively negative vote-shading by the distinct voter groups in response to monetary transfers. Empirical evidence on such vote-shading is provided in Leight et al. (2020); Vicente (2014); Cruz et al. (2016); Hicken et al. (2018) and Malmendier and Schmidt (2017) provide experimental evidence that recipients change behavior in favor of a gift-giver. Therefore, a politician who anticipates vote-shading minds the balance of power between the group of voters who reward as opposed to punish him when setting a bailout to maximize his reelection chances.

Socially optimal and vote-share maximizing bailouts are not necessarily at odds when taking a narrow perspective. In the end, a larger firm needs more employees or creditors to run its business, and those are also voters. But in modern times, large firms often operate globally, and the workforce has become more international. Rising global labor migration, international capital markets, and cross-border firm supply chains have contributed to the segmentation of firm stakeholders into a domestic and a foreign group, see Figure 1. If a

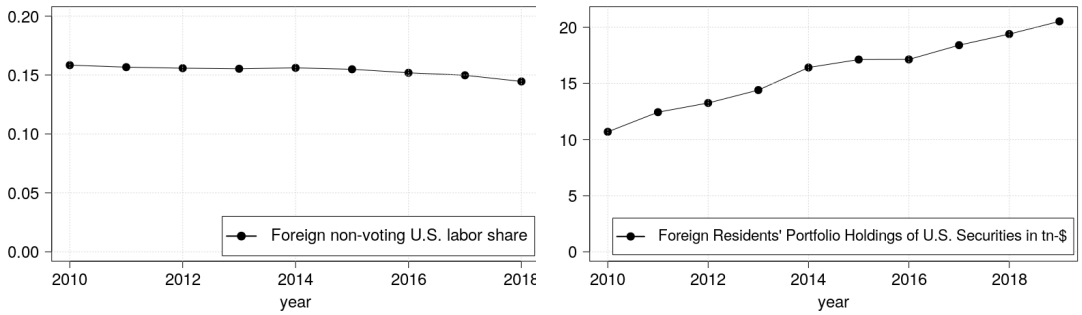

Figure 1: Left: Foreign non-voting US population (excl. naturalized foreign-born) as share of U.S.-employed labor force, source: U.S. Census Bureau. Right source: U.S. Department of the Treasury.

firm fails, then only domestic firm stakeholders can hold the politician accountable via their vote. As the politician maximizes his chances of getting reelected, he, therefore, considers not the entire interest group of firm stakeholders but only the sub-group of firm stakeholder voters. If some firm stakeholders are foreign without voting rights, a discrepancy between optimal and vote-share maximizing bailouts arises, which is at the heart of this paper. The question I analyze is, to what extent do foreign stakeholders, (not) impact vote-share maximizing bailouts, and what is the distance to the social optimum? Answering such questions may shed light on bailout policies employed during the 2012-2013 Cypriot banking crises. Large hair-cuts (losses) on deposits of the Bank of Cyprus were then justified by the conjecture that many deposit accounts belonged to Russian oligarchs, i.e., non-EU residents, (NY Times, 2013).

To analyze the impact of foreign stakeholders on bailouts, I consider a firm that is located in the country of the politician's governance. The country is populated by voters, some of whom are firm stakeholders. To link the firm's stakeholder structure to the political economy, I build on a probabilistic voting model (Lindbeck and Weibull, 1987; Dixit and Londregan, 1996; Gavazza and Lizzeri, 2009) with two special interest groups, firm stakeholders and non-stakeholders who are not affiliated with the firm. All non-stakeholders vote. As the main innovation to the existing literature, only some firm stakeholders are domestic and thus equipped with voting rights ('stakeholder voters') while the firm also employs foreign stakeholders without voting rights, e.g., green card holders or seasonal workers. As the main contribution, I analyze how changes in the relative size of special interest groups impact the electorate where some group members have no voting rights but pay or receive monetary transfers. As

the firm is failing, the politician faces upcoming elections. All voters have an idiosyncratic and exogenous propensity to vote for the politician (political ideology). But this propensity can be shifted (vote shading) by a bailout provision. The group of voters that receives the bailout engages in positive vote-shading to reward the politician. The voter group who does not receive but pays for the bailout via budget-balancing taxes engages in negative vote-shading to punish. The extent of positive and negative vote-shading depends on the size of monetary transfers. Transfers, in return, depend on the size of the granted bailout, the voter and stakeholder population size and the *voter concentration at the firm level*, i.e., the share of domestic stakeholders among all stakeholders. Since vote-shading impacts the electorate, bailouts become endogenous equilibrium objects. As a contribution to the too-big-to-fail literature, we will analyze whether and how the total measure of all stakeholders (firm size) affects bailouts relative to the total voter population.

I analyze and compare two different set-ups for redistribution and financing schemes of bailouts. In the first set-up foreigners are not taxed (tax treaty) and have no claim on the bailout. The use case is seasonal employees. In this context, I derive an irrelevance result: If the firm grows by exclusively employing more foreign stakeholders while maintaining the level of domestic stakeholders with voting rights constant (voter-neutral firm growth), the vote-share maximizing bailout does not move. This holds since the balance of power between stakeholder and non-stakeholder voters in the election remains unchanged as the firm grows. The result is in contrast to the too-big-to-fail literature and the literature on socially optimal bailout provision according to which bailouts grow with firm size respectively with the measure of agents who suffer as a result of firm failure. As an additional contrast, as the firm substitutes foreign for domestic stakeholders while holding the firm's size fixed, I show that the vote-share maximizing bailout increases while the socially optimal bailout stays constant. Intuitively, the balance of power between stakeholder and non-stakeholder voters shifts as the voter-concentration at the firm level grows since under a fixed set of voters, such substitution requires non-stakeholder voters to migrate into the group of stakeholder voters. As more stakeholders reward the politician for the bailout provision, while fewer non-stakeholder voters punish him for taxation, he optimally increases the bailout. The main takeaway from the first set-up is that firm size matters for bailouts only if firm growth stems from an increase in the measure of voters at the firm level. Foreigners in the form of seasonal employees are irrelevant for bailouts.

Is this result robust when considering a country that employs greencard holders? In the second set-up, foreign firm stakeholders pay taxes and receive a share of the bailout, similarly to the Covid-19 stimulus checks sent out in the U.S. to IRS taxpayers during the Corona pandemic in 2020. Yet, foreigners cannot vote. In this context, I derive a relevance result. The employment of foreign stakeholders impacts the electorate and therefore changes vote-share maximizing bailouts. To understand the main mechanism, while an increase in the foreign workforce leaves the balance of power between stakeholder and non-stakeholder voters unaltered, foreigners impact the electorate by changing monetary transfers from and to voters, thereby altering the extent of vote-shading by voter groups. Foreigners share the burden of financing the bailout with the group of all voters. Thus, the politician's punishment by the group of non-stakeholder voters is appeased, and the more so, the more foreigners are employed and pay taxes. On the other hand, foreigners are eligible to receive a share of the bailout. Consequently, the bailout provision becomes less politically effective in generating rewards since the subsidy leaks to a group of agents that cannot vote.

As the firm grows by employing more foreign stakeholders, I show that the vote-share maximizing bailout now changes and can increase or decrease, although foreigners cannot vote to reward or punish. The monotonicity depends on the curvature of the stakeholder voters' utility function, which determines when the soothing effect on non-stakeholder voters caused by the tax reduction is weaker than the leakage effect. The politician, therefore, compensates either by increasing or reducing the subsidy. The vote-share maximizing subsidy remains increasing in the measure of stakeholder voters in this second set-up (robustness). Thus, firm size is relevant for bailouts when foreigners pay taxes and receive benefits? The vote-share maximizing subsidy increases at a distinct rate when employing more domestic as opposed to more foreign stakeholders, or can even decline in the latter case. Therefore, the substitution of foreign for domestic stakeholders while holding the firm's size constant has a non-monotonic impact on the vote-share maximizer. As a consequence, even in the second set-up, a small firm that employs many voters can receive a larger bailout than a large firm that majorly employs foreign stakeholders without voting rights. I derive conditions on the (dis)-utility functions under which the monotonicity of the substitution effect can be determined.

Moreover, in either redistributive system, the vote share maximizing bailout undercuts the social optimum once the firm employs foreign stakeholders.

Literature

Closest related to this paper are Lindbeck and Weibull (1987); Dixit and Londregan (1996); Gavazza and Lizzeri (2009) who also analyze probabilistic voting models where voters belong to special groups, hold heterogeneous ideologies over candidates, and where voters endogenously shade their vote depending on the transfers set by the politician under a budget-balancing constraint. But unlike these papers, I analyze changes in the relative size of special interest groups and also introduce foreign stakeholders without voting rights that can dilute or increase group transfers. While here, the politician's choices and the implied transfers are common knowledge among all voters, in Gavazza and Lizzeri (2009), voters only imperfectly observe aggregate spending, leading to excessive government debt.

Beyond the literature on probabilistic voting, this paper adds to the wider literature analyzing the effects of electoral cycles on public spending behavior. In Persson and Svensson (1989); Alesina and Tabellini (1990, 1988); Tabellini and Alesina (1990), public debt acts as an instrument of the current government to restrict policy-making of a future government that has distinct preferences. In Aghion and Bolton (1990) the governing party employs public debt as a strategic tool to create a constituency. Unlike these papers, here, we do not study a time-inconsistency problem of governments but instead, analyze how the contemporaneous relative size of voter and stakeholder groups with opposing interests shapes policy. Yet, similar to Aghion and Bolton (1990), also here voters have a double role and can be firm stakeholders, thus, changing their voting behavior according to their membership to a distinct interest group.

Drazen (1998) and Guembel and Sussman (2009) analyze models where a sovereign issues debt to local and foreign agents, and locals can vote on repayment. Here, the timing is reversed. Monetary transfers occur before the election, and we study how the politician sets transfers to alter future vote-shading in his favor. Further, here the group of voters is partitioned into firm stakeholders and non-stakeholders with opposing interests. Schilling (2019) analyzes a bank's revenue maximization problem where bank creditors are also voters. In a two-stage game, the bank trades-off the insurance value of creditor-voters that generate large bailouts conditional on bank failure, against the fact that more creditors increase bank fragility and make default and the necessity of bailouts more likely ex ante. Here instead, we disentangle size effects from voter effects since only some firm stakeholders are voters and focus on how

the voter-concentration among stakeholders affects vote-share maximizing and socially optimal bailouts conditional on firm failure.

In Maskin and Tirole (2019), voters are uncertain about a politician's preferences over interest groups. The politician can signal his care by targeted spending on particular groups, thus impacting the electorate. Here instead, there is no uncertainty on the politician's preferences since he equally cares for all voters and groups. Instead, voters vote according to their group membership, and the relative size of groups impacts the electorate and thus total public spending. Lizzeri (1999) discusses the link between redistributive politics and debt accumulation. Similarly to there, also here, the politician uses debt as a tactical tool of redistributive politics. But here, voters are heterogeneous, having political ideologies, and belong to special interest groups while there, voters have identical preferences but face uncertainty on the outcome of future redistribution. In Velasco (2000); Battaglini and Coate (2007, 2008), policy decisions on public spending and taxation are made by a legislature consisting of representatives of symmetric special interest groups, determining transfers and budget deficits across time. Bouton et al. (2016) study the impact of entitlements, i.e., precommitments of future resources, on debt accumulation in a model with symmetrically-sized generations. Unlike these models, here instead, group sizes are asymmetric, and we study how changes in this asymmetry impact the electorate and thus vote-share maximizing bailouts. Unlike Lizzeri (1999); Velasco (2000); Battaglini and Coate (2007, 2008); Bouton et al. (2016), we do not study debt accumulation but the politician keeps a balanced budget.

2 The Model

Under slight abuse of notation, in this paper, groups of agents and the measure of the according group will be denoted by the same letter.

There are a non-strategic firm and three types of agents: a continuum of voters of measure V, foreigners of measure F and a politician A. Both voters and foreigners, are located in the same country under the jurisdiction of politician A. The non-strategic firm is failing. She employs stakeholders of measure $D \subset (V \cup F)$. We also refer to D as the firm's size or stake.[1]

[1]This can be justified by seeing that to operate assets I, the firm needs to optimally choose the measure of her stakeholders $D(I)$ such as creditors, suppliers, and employees. Thus, firm size and the measure of stakeholders are related variables.

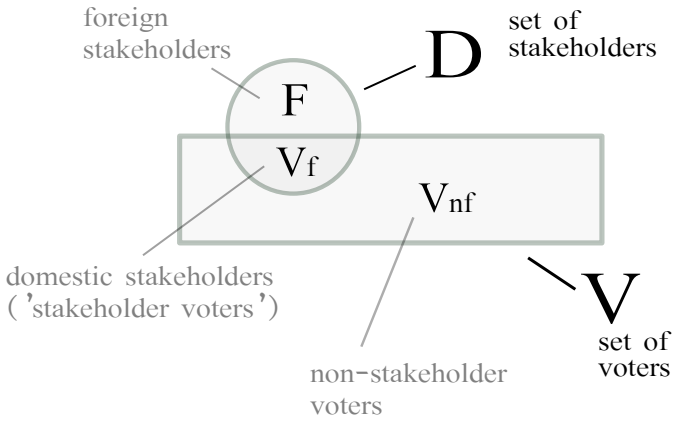

Figure 2: Composition of voters V and firm stakeholders D: Stakeholder-voters V_f are both in V and D. Foreign stakeholders F are not in V but in D. Non-stakeholder voters V_{nf} are in V but not in D.

Voters versus Stakeholders Not all firm stakeholders are equal. To connect the political economy to the nature of the firm, I assume that among the firm's stakeholders, some are voters, and some are foreigners without voting rights. Let $\rho \in [0, 1]$ denote the *'voter-concentration'* in stake D, to pin down the fraction of firm stakeholders with voting rights.

$$V_f = \rho \cdot D \leq D \tag{1}$$

The set (and measure) $V_f = V \cap D$ contains the firm's stakeholders with voting rights. We, therefore, call members of V_f 'stakeholder voters' and also 'domestic stakeholders.' In contrast, $F = (1 - \rho)D = |D \setminus V_f|$ denotes the measure of foreign stakeholders who lack voting rights and $V_{nf} = V \setminus V_f$ is the set of non-stakeholder voters, i.e., voters who have no stake in the firm.

The voter-concentration allows us to disentangle effects due to firm size D from effects due to the political economy. On average, every stakeholder corresponds to $\rho \in [0, 1]$ votes. The case $\rho = 1$ means that the entire stake is comprised of voters, $\rho \leq 1$ meaning that every stakeholder corresponds to maximally one vote. For now, we will treat ρ like an exogenous parameter. Later, we allow ρ to change with the measure of stakeholders D.

Ideologies When faced with the failing firm, the governing politician A is up for reelection. In the elections, all voters vote, and can vote either for A or for a contender B. Building on the probabilistic voting model of Lindbeck and Weibull (1987), voters have heterogeneous preferences in favor of the governing politician and his contender: Each voter $i \in V$ infers an idiosyncratic, policy-

independent benefit σ_i^A ('ideology') if A is reelected, and equivalently infers benefit σ_i^B if B is elected. Voter ideologies are unobservable. Assume that the differences

$$\Delta_i = \sigma_i^B - \sigma_i^A \tag{2}$$

are iid uniformly distributed according to $U(-b, b)$ where we set $b > 0$ below in (6). Denote by f_Δ the uniform density. Voter ideologies realize independently of whether a voter belongs to the group of stakeholder or non-stakeholder voters.

Bailout Financing and Distribution The politician who faces the failing firm has to make a policy choice on the firm bailout $S \geq 0$. To finance the bailout in a budget-balancing way, the politician levies lump-sum taxes

$$\tau(S) = \frac{S}{V} \in [0, 1] \tag{3}$$

on all voters. In the benchmark case, the politician exclusively provides the bailout to a subset of voters, the group of stakeholder voters V_f, yielding the pro rata share

$$c(S) = \frac{S}{V_f} \in [0, 1]. \tag{4}$$

Foreign stakeholders receive no share of the bailout and pay no taxes. We change this property in section 4, where we treat the case of greencard holders.

Figure 3: Redistribution with tax treaty without benefit claims

Special Interest Groups and Economic Voting (Vote Shading) Since the bailout is exclusively provided to stakeholder voters, non-stakeholder voters V_{nf} only contribute to the bailout financing. Stakeholder voters are net beneficiaries of the bailout since the pro rata share exceeds the tax $c - \tau > 0$, for all S, see Figure 3. Since voters are treated differently by the politician via the bail-

out provision, voting behavior depends on both the political ideology and the membership to either the group of stakeholder or non-stakeholder voters. Let $\mathcal{V}_f(S)$ and $\mathcal{V}_{nf}(S)$ denote the indirect utility which stakeholder respectively non-stakeholder voters infer from A's bailout choice S. Stakeholder voters reward the politician, and non-stakeholder voters punish the politician for the provision of the bailout since it increases respectively lowers their allocation.[2] Rewards and punishments are induced by shading votes away from the ideology (economic voting). Stakeholder voters vote for A if and only if their ideology difference realizes as

$$\Delta_i \leq \mathcal{V}_f(S) \tag{5}$$

while non-stakeholder voters vote for A if $\Delta_i \leq \mathcal{V}_{nf}(S)$. Due to the uniform ideology distribution, the likelihood that stakeholder voter i votes for A thus equals $F_\Delta(\mathcal{V}_f(S)) = \mathcal{V}_f(S)$ while a non-stakeholder voter votes for A with likelihood $\mathcal{V}_{nf}(S)$. Vote shading increases in intensity, the larger the bailout provision. Assume that stakeholder voters have an indirect utility function $\mathcal{V}^f(S) = g(c(S) - \tau(S))$ while non-stakeholder voters infer the indirect disutility from tax τ, given by $\mathcal{V}_{nf}(S) = -h(\tau(S))$. Assume that g is a positive, strictly increasing, twice differentiable and concave function and $h(\cdot)$ is a positive, strictly increasing, twice differentiable and convex function. The size of the provided bail-out and the relative group size of stakeholder to non-stakeholder voters impact the electorate. In the benchmark model, foreign stakeholders do not matter for the electorate since they have no voting rights and pay or receive no transfers. This feature changes in section 4. Assume that a zero bail-out policy implies no vote-shading, $g(0) = h(0) = 0$. For the support of Δ, assume that $b > 0$ is such that

$$b > \max(\max_S g(S), \max_S h(S)) \tag{6}$$

implying that there exist voters $i \in V$ with extreme ideologies that will vote for A no matter how detrimental and will vote against A no matter how favorable A's policy choice S is for i's group.

Politician's Policy Choice Taking the stakeholder composition and the set of voters (V, V_f, D, F) as given, the politician's objective is to set the bail-out to maximize his expected vote share while maintaining a balanced budget. In do-

[2] We normalize endowments of all agents to zero. Independently of endowments or income, the tax reduces consumption of non-stakeholder voters while the bailout increases the consumption of stakeholder voters.

ing so, the politician has rational expectations. Throughout the paper, we hold the set of voters V fixed. We study how changes in the voter-composition $V_f \cup V_{nf}$, the firm's size D and the firm's stakeholder composition $V_f \cup F$ impact the politician's decision problem, and ultimately vote-share maximizing bailouts. We then contrast vote-share maximizers with socially optimal bailouts. We consider first firm size effects, where the firm either grows by employing more foreigners (immigration) or more domestic stakeholders (migration from non-stakeholder voters to stakeholder voters). Then, we study substitution effects where the firm maintains its size and replaces foreign by domestic stakeholders.

3 Vote-Share Maximization under a Tax Treaty without Benefit Claims (Seasonal Employees)

As the firm fails, the politician decides on a bail-out size $S \geq 0$, taking into account the measure of voters, the measure of stakeholder voters, and the measure of foreign stakeholders (V, V_f, F). Let $v_D = V_f/V$ the share of voters in favor of a bail-out. Given the uniform ideology distribution, the politician's expected vote share when granting bailout S equals

$$A(S) \equiv v_D \; g(c(S) - \tau(S)) - (1 - v_D)\, h(\tau(S)) \tag{7}$$

Foreign stakeholders do not impact the vote-share in this benchmark case since they neither vote nor receive or pay transfers. This feature changes in section 4. When maximizing his vote-share $A(S)$, the politician takes into account how a change in the subsidy alters the tax and the pro rata share, thus changing the extent of positive and negative vote-shading by the group of stakeholder and non-stakeholder voters. We call the subsidy which maximizes (7) the *vote-share maximizing subsidy* S_F^*. The politician's bailout choice S_F^* determines the tax $\tau^*(S_F^*)$ to levy on all voters and, together with the stakeholder-voters' group size V_f, the pro rata share to stakeholder voters $c^* = S_F^*/V_f$. An interior vote-share maximizing bailout equalizes a stakeholder-voter's marginal utility of increasing the pro rata share net of the tax with a non-stakeholder voter's marginal disutility from increasing the tax. For this trade-off to be precise, the politician reweighs the marginal (dis)utilities with the share of voters that experience utility versus disutility from the bailout. Thus, the relative group size v_D matters.

In the benchmark model, the following redistribution identity holds

$$(1 - v_D)\frac{\partial \tau}{\partial S} = v_D \left(\frac{\partial (c(S) - \tau(S)))}{\partial S} \right), \tag{8}$$

saying that every marginal change in the tax, aggregated over the non-stakeholder voter population, is redistributed and thus must equal the marginal net increase in the stakeholder voters pro rata share. As a consequence of this identity, the first order condition that characterizes an interior vote-share maximizer is given by

$$g'\Big(c(S_F^*) - \tau(S_F^*)\Big) - h'\Big(\tau(S_F^*)\Big) = 0 \tag{9}$$

In the next sections, this paper analyzes how the vote-share maximizing bailout S_F^* changes under firm growth and stakeholder substitution.

3.1 Firm Size Effects

Proposition 3.1 (Firm Size effects)**.** *Fix V. If the firm grows in size D by*
(i) employing more stakeholder-voters V_f, then the vote-share maximizing subsidy S_F^* increases and increases strictly in V_f whenever S^* is interior (too-big-to fail look-alike). Moreover, $S^* = 0$ for $V_f \to 0$, independently of F.
(ii) employing more foreign stakeholders F (voter-neutral firm growth), then the vote-share maximizing subsidy is unchanged, i.e. S_F^* is independent of F.

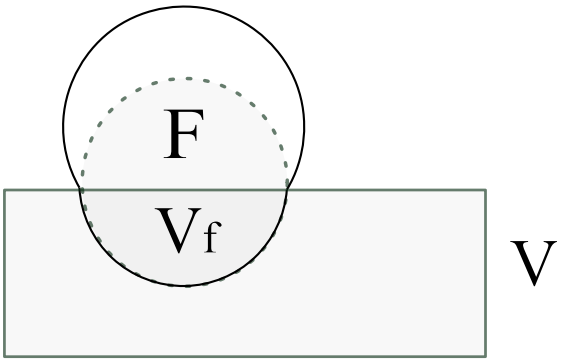

Figure 4: Voter-Neutral Firm Growth: The firm can grow while keeping the measure of stakeholder-voters at the firm level constant, by employing exclusively more foreign stakeholders. The balance of power between stakeholder and non-stakeholder voters in the elections is then preserved.

As the firm employs more foreign or domestic stakeholders, the firm's stakeholder population D increases. By the Proposition, only if the firm's stakeholder population grows by employing more voters, then the vote-share max-

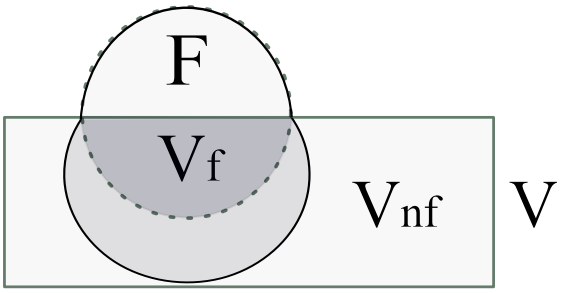

Figure 5: Too-big-to-Fail Look-alike: Firm Growth with change in the balance of power between the groups of stakeholder and non-stakeholder voters. For the set of stakeholder voters V_f to grow, the set of non-stakeholder voters V_{nf} must shrink, and the relative group size changes, causing the politician to adopt the bailout.

imizing subsidy increases. If the firm grows by employing more foreigners without voting rights, then the vote-share maximizing bailout stays unchanged, see Figures 4 and 5. For the economics behind the result, as the firm employs more voters, the group of agents that reward the politician for the bail-out increases relative to the group of agents that punish him. Thus, to maximize his vote-share, the politician grants a higher bail-out. If the firm employs more foreigners, the balance of power is unchanged, and thus so is the bailout.

We call the first effect 'Too-big-to-fail Look-alike': Imagine an outsider who only observes the change in the firm's size but not the type of stakeholders that are added to the firm. If the added stakeholders are voters, the firm's bailout increases, but to the outsider, it may appear as if the cause for the rise in the bailout was the growth in the firm's size. The second effect in Proposition 3.1, on the other hand, would then puzzle the same outside observer since it opposes the too-big-to-fail theory and makes it appear as if there was no connection between firm size and bailouts.

By Proposition 3.1, and the formulae for the pro rata share and the tax, for a fixed set of voters V, the measure of stakeholder voters at the firm level V_f is a sufficient statistic for the equilibrium subsidy $S^* \equiv S^*(V_f)$. See that the equilibrium-characterizing equation (9) is independent of the total measure of stakeholders D and the measure of foreign stakeholders F. Thus, a change in firm size is relevant for bailouts if only if the change in size stems from a change of voters at the firm level. Allover, disentangling size effects from voter effects on the bailout is not yet fully possible at this stage, which is why next, we look at stakeholder substitution under a fixed firm size.

3.2 Stakeholder Substitution Effects: An Irrelevance Result

For a given firm size, the firm's voter-concentration pins down the measure of stakeholder-voters via the identity $V_f = \rho\ D$. When holding the firm's size fixed, a rise in the voter-concentration implies an increase in the measure of voters at the firm level, i.e., a substitution of foreign for domestic stakeholders with voting rights, see Figure 6. The voter concentration is, therefore, a useful tool to disentangle effects on the subsidy due to changes in the firm's size from effects due to a change of voters at the firm level. In practice, this exercise in stakeholder substitution requires that the voter-concentration can be changed independently of the firm's size.

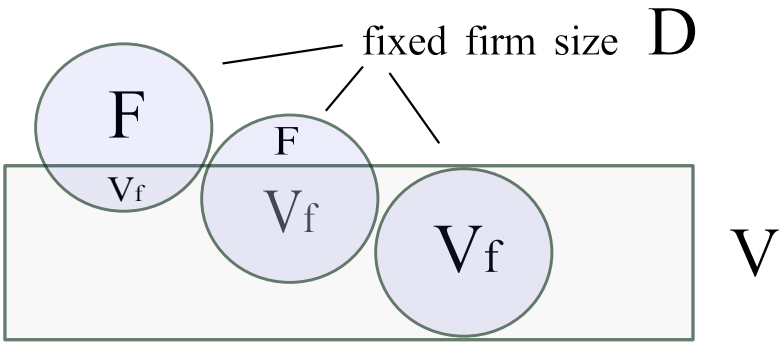

Figure 6: Change in stakeholder composition via substitution for fixed firm size: For a fixed set of voters V and firm size D the firm can substitute foreign for domestic stakeholders, thereby increasing the measure of voters at the firm level. The balance of power between stakeholder voters V_f and non-stakeholder voters $V \setminus V_f$ changes while firm size and thus socially optimal bailouts remain fixed.

On the other hand, instead of fixing the firm's size, one can similarly fix the measure of stakeholder voters. Different pairs of a firm's size and a voter-concentration (D, ρ) can attain the same measure of stakeholder-voters, and thus via Proposition 3.1 the same equilibrium subsidy. Describing all such combinations (ρ, D), requires the voter-concentration to change in the firm's size in a particular way:

Definition 3.1 (Voter-neutral Concentration). *Fix an arbitrary level of stakeholder-voters $\bar{V}_f \leq V$. There exists a unique voter-concentration function $\rho_{\bar{V}_f}(\cdot) \in [0,1]$ such that*

$$\bar{V}_f = \rho_{\bar{V}_f}(D) \cdot D, \quad \text{for all } D \geq \bar{V}_f \tag{10}$$

We call the decreasing function $\rho_{\bar{V}_f}(D) \equiv \bar{V}_f / D$ the 'voter-neutral concentration function at level $\bar{V}_f$'. We further say, that a voter-concentration $\rho(\cdot)$ changes at the voter-

neutral rate for level $\bar{V}_f$ to indicate that function $\rho(\cdot)$ changes in the firm's size to keep the measure of shakeholder voters constant at level $\bar{V}_f$, i.e. changes at the rate of $\rho_{\bar{V}_f}(\cdot)$.

The firm can grow in size in a voter-neutral way by exclusively employing additional foreign stakeholders while keeping the measure of voters at the firm level constant, thus fixing a particular level of political economy impact on the firm, see Figure 4. From Proposition 3.1, we obtain the following Corollary with testable predictions

Corollary 3.1 ((Ir)relevance of Firm Fize for Bail-outs under Voter-Neutrality)**.** *(i) Fix a level of stakeholder voters $\bar{V}_f$. If the firm increases her size D while*
(a) altering her voter concentration at the voter-neutral rate for level $\bar{V}_f$, then the vote-share maximizing subsidy S^*, the pro rata share $c^* = S^*/V_f$ to domestic stakeholders, and the equilibrium tax imposed on all voters $\tau^* = S^*/V$ all stay constant.
(b) altering her voter concentration at a rate below the voter-neutral rate, then the vote-share maximizing subsidy S^* declines
(ii) Stakeholder Substitution: Fix the firm's size D. The vote-share maximizing subsidy S_F^* strictly increases in the voter-concentration ρ.

All three results in Corollary 3.1 follow directly from Proposition 3.1 since only voter-neutral changes in firm size preserve the equilibrium subsidy. When holding the firm's size fixed, as the firm substitutes foreign with domestic stakeholders, the voter-concentration and thus also the subsidy increase. This holds since an increase in the voter-concentration in the stake alters the balance of power in the electorate, causing the politician to set higher bailouts even though firm size remained constant. The proof follows from Lemma 3.1 (i) and (ii): An increase in the voter-concentration at a constant firm size requires a simultaneous increase in the measure of stakeholder-voters and a lowering of the measure of foreign stakeholders. The first effect increases the subsidy, while the latter effect leaves the subsidy unaltered by (ii). If the voter-concentration alters with firm size at a rate slower than the voter-neutral rate, the measure of voters at the firm level drops, and thus the vote-share maximizing bailout must decline. This is, for instance, the case if the firm grows in size while reducing the domestic workforce.

All three political economy results in Corollary 3.1 oppose the too-big-to-fail theory. As a consequence of the political economics at the firm level, the measure of voters at the firm level is a confounding variable, affecting both the firm's size and the equilibrium bailout. The firm's size is thus an irrelevant

variable for forecasting the firm's bailout when controlling for the measure of voters at the firm level.

3.3 Socially optimal versus Vote-Share maximizing Bailouts

To contrast vote-share maximizing bail-outs with socially optimal bail-outs, consider the social planner. He ignores political ideologies and values all agents, foreign and domestic stakeholders, equally. The social planner levies taxes on all agents, including foreigners,

$$\tau_s = \frac{S}{V + (1-\rho)D} \tag{11}$$

and allocates[3] a gross pro rata share (before taxation)

$$c_s = \frac{S}{D} = \frac{S}{V_f + (1-\rho)D} \tag{13}$$

to all stakeholders, including foreigners, giving them a symmetric allocation $c_s - \tau_s$. In comparison to the politician's vote-share maximization, now non-stakeholder voters not only cross-subsidize (domestic) stakeholder voters but also foreign stakeholders. Assuming that all stakeholders share the same utility function $g(\cdot)$, the social planner maximizes utilitarian welfare

$$W(S,\rho,D) = \Big(\frac{(1-\rho)D}{V+(1-\rho)D} + \frac{\rho D}{V+(1-\rho)D}\Big)\, g(c_s(S) - \tau_s(S)) - \frac{V-\rho D}{V+(1-\rho)D}\, h(\tau_s(S)) \tag{14}$$

via S, taking as given the measure of all voters V, the measure of all stakeholders D, and the voter-concentration ρ. Let S^*_{soc} the socially optimal subsidy that maximizes (14). Then,

Proposition 3.2 (Social Optimum). *The socially optimal subsidy S^*_{soc}*
(i) equals the vote-share maximizer S^*_F for a fixed firm size D only if the firm employs no foreign stakeholders $\rho = 1$.
(ii) monotonically increases in the firm's size D, independently of whether the firm grows due to a rise in the foreign or the domestic stakeholder group

[3]Here, we use that the stake can be decomposed as

$$D = \rho D + (1-\rho)D = V_f + (1-\rho)D, \tag{12}$$

(iii) For a fixed firm size D, the socially optimal subsidy changes in the voter concentration ρ. If and only if

$$g''\Big(\frac{S}{D} - \frac{S}{V + (1-\rho)D}\Big) + h''\Big(\frac{S}{V + (1-\rho)D}\Big) > 0 \tag{15}$$

then the socially optimal subsidy declines in the voter-concentration, i.e., declines as the firm substitutes foreign for domestic stakeholders.
(iv) The socially optimal subsidy exceeds the vote-share maximizing subsidy $S_F^*(\rho) \geq S_F^*(\rho)$ for every voter-concentration $\rho \in [0, 1)$, i.e. as soon as some workers are foreign.

To understand the connection between the socially optimal and the vote-share maximizing subsidy, see that if the stake is exclusively composed of domestic stakeholders, $\rho = 1$, then all stakeholders are also voters, and the objective function of the social planner and the politician coincide, welfare equals the expected vote-share at subsidy S:

$$W(S, 1, D) = A(S); \quad \text{and } \tau_s = \tau; \quad c_s = c \tag{16}$$

Consequently, the socially optimal and the vote-share maximizing subsidies are the same $S_{soc}^*(0) = S_F^*$. As soon as the firm also employs foreign stakeholders, the objective functions of the politician and the social planner differ.

Result (ii) is treated in the appendix but is intuitive. The social planner increases his bailout as more stakeholders would suffer from a firm failure. In contrast, we know by the irrelevance result (i) in Corollary 3.1, that the vote share maximizing subsidy remains constant if the firm's growth exclusively stems from an increase in the foreign stakeholder group.

It is worth noting that the socially optimal bailout increases at a distinct rate when employing more foreigners rather than more domestic stakeholders. The reason is that an increase in the foreign workforce lowers the tax to all agents. An increase in firm size via an increase in the domestic workforce, on the other hand, keeps the taxable population constant since the set of all voters is fixed, requiring migration from the group of non-stakeholder voters into the group of stakeholder voters. As a consequence of such changes in the taxable population, the socially optimal subsidy is not independent of the voter-concentration when keeping the firm's size fixed. Recall, as the voter concentration increases, the stakeholder composition changes since the firm substitutes foreign for domestic stakeholders. Thus the population of net taxpayers, i.e., of non-stakeholder voters, declines while the measure of agents that would suffer

from a firm's failure and thus receives a bailout remains constant. Moreover, since the measure of net taxpayers declines, the tax that is charged increases in the voter-concentration while the net pro rata share after tax, payable to all stakeholders, declines. For a fixed bailout, thus, both the group of all stakeholders and the group of non-stakeholders suffer more as the voter-concentration goes up. The effect of an increase in the voter-concentration on the socially optimal bailout is therefore generically non-monotone and depends on the concrete utility and disutility function, given by condition (15).

From condition (15), we see that if the firm's stakeholders are risk-neutral, then the socially optimal subsidy declines in the voter-concentration. If, instead, the non-stakeholder voters are risk-neutral, then condition (15) does not hold, and the socially optimal subsidy grows in the voter-concentration. In contrast to the social optimum, we know that for a fixed firm size, the vote-share maximizing subsidy always rises in the voter-concentration by Corollary 3.1 (ii).

The change of the social optimum in the voter-concentration is also important for determining whether or not the socially optimal bailout exceeds or undercuts the vote-share maximizing bailout at a fixed firm size. It turns out that the socially optimal bailout exceeds the vote-share maximizing bailout for every voter-concentration even though the social optimum may not behave monotonically in the voter-concentration. We know that if the firm only employs domestic stakeholders, the socially optimal and the vote-share maximizing bailout coincide. Moreover, the vote-share maximizing bailout strictly increases in the voter-concentration and equals zero for a voter concentration $\rho = 0$, that is, if the firm employs no voters. The socially optimal bailout exceeds zero even if no voter works at the firm. The result thus says, even if the social optimum was non-monotonic or declined in the voter-concentration, it never undercuts the vote-share maximizing bailout for any concentration in $[0, 1]$.

4 Taxation and Benefits to Foreign Firm Stakeholders (Greencard Holders)

The main model assumes that foreign stakeholders are not taxed and receive no pro rata share given a firm failure. Such a model applies when foreign stakeholders are, for instance, visitors, seasonal workers or international creditors or suppliers of the firm. The model, so far, is not a good fit when foreign stake-

holders have permanent work and resident permits, such as green card holders, that are taxed in the country they work, and as such also have claims on benefits. The 2020 Covid 19- U.S. stimulus checks are, for instance, not only allocated to U.S. voters but also to alien residents that file taxes in the United States but lack voting rights. To model the case of foreign stakeholders with permanent work permits, we change the model, and assume, the politician levies taxes on all voters and foreign stakeholders

$$\tilde{\tau} = \frac{S}{(V+F)} \tag{17}$$

to finance bail-out S. In return, also foreign stakeholder have a claim on the bail-out. The pro rata share equals the bail-out per stakeholder (not per voter)

$$\tilde{c} = \frac{S}{D} = \frac{S}{V_f + F} \tag{18}$$

and is thus independent of the voter-concentration when the stake is fixed. The change in monetary transfers is depicted in Figure 7 in comparison to Figure 3, and Figure 8.

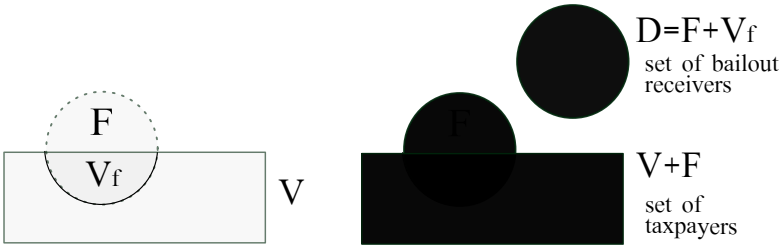

Figure 7: Redistribution in model with tax duties and benefit claims

As before, the politician takes as given the measure of stakeholders D, the measure of stakeholder voters $V_f \subset V$, and the unchanged ideology distribution when choosing the bail-out S that maximizes his vote-share

$$\tilde{A}(S,F) = \frac{V_f}{V}\, g\Big(\frac{S}{V_f+F} - \frac{S}{V+F}\Big) - \Big(1 - \frac{V_f}{V}\Big)\, h\Big(\frac{S}{V+F}\Big) \tag{19}$$

As the two main difference to the benchmark model in section 3, the measure of foreign stakeholders now impacts the vote-share via transfers, and non-stakeholder voters now subsidize not only domestic but also foreign stakeholders without voting rights. As in the main model, the pro rata share exceeds the tax $\tilde{c} \geq \tilde{\tau}$ for all bailouts S. Thus, all stakeholders are net beneficiaries

of the bail-out, posing a negative externality on non-stakeholder voters. Vote-share maximization will therefore take a different form since the subsidy 'leaks' to non-voting agents, diluting its political effectiveness by causing less positive vote-shading, see (18). On the other hand, foreign stakeholders now also pay taxes, sharing the burden of subsidy financing, and thereby alleviating the politician's punishment by the group of non-stakeholder voters, see (17).

We want to repeat our exercise, analyzing how growth in the firm's size impacts the vote-share maximizing subsidy under leakage.

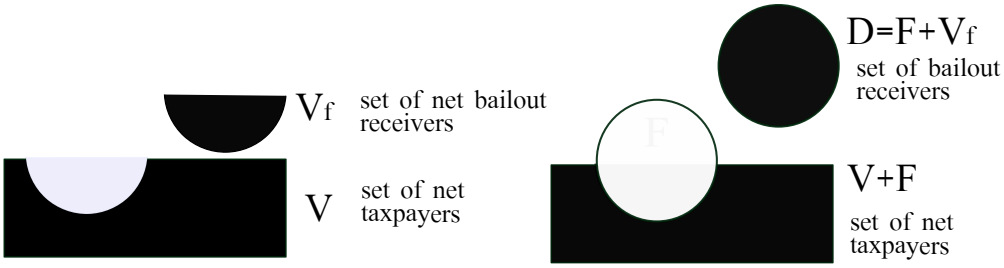

Figure 8: Comparison between redistribution mechanisms: With tax treaty on the left with tax duty and benefit claims on the right.

Proposition 4.1 (Firm Size Effects under Leakage)**.** *Assume the politician taxes and pays subsidies to all stakeholders. For a fixed measure of foreign stakeholders $F > 0$,*
(i) the vote-share maximizing subsidy equals zero for V_f small.
(ii) the vote-share maximizer $\hat{S}_F^*$ monotonically increases in the measure of stakeholder voters.
(iv) Under leakage, the vote-share maximizer alters in F in a non-monotonic way
(a1) If the utility function g has relative risk aversion coefficient greater than one, $-xg''(x)/g'(x) > 1$ for all x, then the vote-share maximizing subsidy monotonically increases in F.
(a2) If $-xg''(x)/g'(x) > 1$ does generically not hold, and if g and h are 'close to linear', the vote-share maximizer $\hat{S}_F^*$ monotonically declines in F.

Here, 'close to linear' means $g''(x)$ and $h''(y)$ are close to zero for all $x, y \geq 0$. We know result (i) already from the previous redistributive system. It says that the politician will not pay any subsidy, if the firm employs (almost) only foreign stakeholders. The rationale is, to finance the bail-out, the politician needs to raise taxes, thus losing votes from non-stakeholder voters. At the same time, the bail-out cannot reach any domestic stakeholders with voting rights to generate rewards since all employed agents are foreign.

Part (ii) says that the effect from Proposition 3.1(i) is robust under leakage. As the firm employs more domestic stakeholders with voting rights, the subsidy to the firm increases. But as before, an increase in the measure of stakeholder voters necessarily here implies an increase in firm size. For an outside observer, the increase in the subsidy due to an increase in the measure of voters at the firm level can mistakenly be interpreted as a too-big-to-fail effect, looking as if firm size drove the subsidy.

As the key difference to the benchmark model in section 3, here, the vote-share maximizing subsidy does alter in the measure of foreign stakeholders, and in a non-monotonic way. This has several consequences. First, in comparison to the model in section 3, here the measure of voters at the firm level is no longer a sufficient statistic for the bailout. Second, and robust to the previous section, the firm's size alone remains misleading when it comes to forecasting vote-share maximizing bailouts. The fact that the vote-share maximizer can drop as the firm grows by employing more foreign stakeholders directly opposes the too-big-to-fail theory. Even in the case where the hiring of foreign stakeholders does generate a larger subsidy, the rate at which the bailout increases is not the same as the rate at which the bailout increased when employing more domestic stakeholders. As a consequence of these distinct rates, and as in the case of the baseline model in section 3, a small firm can attain the same subsidy as a larger firm with a different stakeholder composition would, see Figure 9 for an example.

To see that the rates differ, note that adding either foreign or domestic stakeholders increases the measure of agents to which the subsidy is allocated, such that the net pro rata share declines to all bailout receivers, and thus the reward to the politician per stakeholder voter drops. But adding domestic stakeholders increases the interest group that rewards the politician with votes while adding foreigners keeps the relative size of voting interest groups constant. Instead, employing foreign stakeholders increases the taxpayer population such that the tax drops for all agents. Therefore, even though the interest groups maintain their size, the addition of foreigners achieves that non-stakeholder voters punish less. When adding domestic stakeholders, on the other hand, the total taxpayer population and thus the tax remains constant, but the group of non-stakeholder voters becomes smaller due to migration, since the set of all voters is fixed. It is therefore clear why adding foreign stakeholders generically has a non-monotonic effect on the vote-share maximizer, see Figure 9. As foreigners are added, the group of agents that punish remains constant in size, but

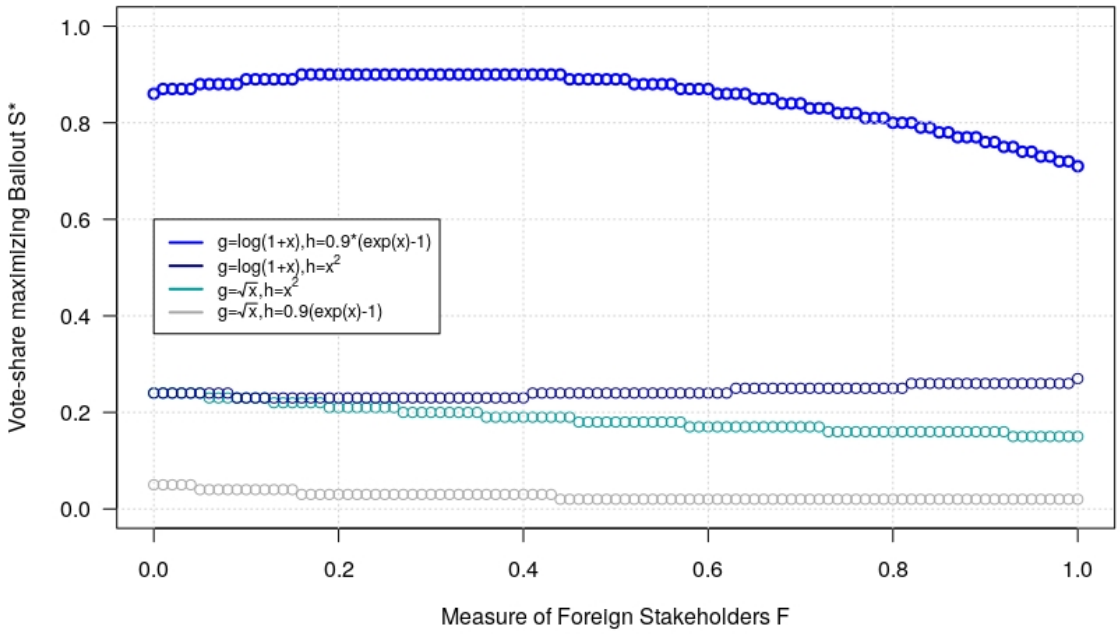

Figure 9: Firm size effects under leakage: As the firm grows by employing more foreign stakeholders, the politician now adjusts the bailout even though foreigners cannot vote to reward him. Moreover, the vote-share maximizing bailout can increase or decrease. The vote-share maximizer can increase or decline as the firm grows by employing more foreign stakeholders. With $V = 1,\ V_f = 0.19$

they punish less due to the drop in taxes. But the group of bailout receiving agents becomes larger, although the group of agents that can reward the politician with votes remains constant. Thus, both the reward per stakeholder voter and the punishment per non-stakeholder voter drop. As a consequence, the curvatures of the utility and disutility functions play an important role.

4.1 Stakeholder Substitution under Leakage

In the previous Proposition 4.1, we increased the firm's size by either employing more domestic or foreign stakeholders. We saw that in either case, the equilibrium subsidy can rise. The question remains, if hiring foreigners increases the vote-share maximizing bailout, is this increase larger than if the firm had hired more domestic stakeholders? What happens under substitution of stakeholders when holding the firm's size fixed?

To keep the firm's size constant at some level $\bar{D} > 0$, an increase in the

measure of stakeholder voters V_f requires a particular decline in the measure of foreign stakeholders $F = (1 - \rho)D$.

Definition 4.1 (Firm-size-neutral Stakeholder Substitution)**.** *The measure of foreign stakeholders F alters at the firm-size-neutral rate of level $\bar{D}$ if a change in the measure of stakeholder-voters reduces the measure of foreign stakeholders in a way that keeps the total measure of stakeholders constant at $\bar{D}$, requiring*

$$F_{\bar{D}}(V_f) = \bar{D} - V_f, \text{ for all } V_f \leq \bar{D} \tag{20}$$

For $V_f \leq \bar{D}$, the pro rata share and the tax under stakeholder substitution with leakage become

$$c(V_f) = \frac{S}{V_f + F_D(V_f)} = \frac{S}{\bar{D}} = const, \quad \tau(V_f) = \frac{S}{V + F_D(V_f)}. \tag{21}$$

See that the pro rata share remains constant in V_f under stakeholder substitution, since the measure of foreign stakeholders also changes in V_f to keep the firm's size at $\bar{D}$. The tax, on the other hand, does change under stakeholder substitution since the taxable population grows with the population of foreign stakeholders. The tax increases in V_f as the firm substitutes foreign for domestic stakeholders since the burden of subsidy financing is shared by fewer agents.

What is the impact on the vote-share maximizing subsidy when substituting foreign for domestic stakeholders while keeping the firm's size fixed?

Proposition 4.2 (Stakeholder Substitution under Leakage)**.** *Let $D \leq V$. When keeping the firm's size D fixed,*
(i) if the non-stakeholder voters' disutility function $h(\cdot)$ is close to linear, then independently of $g(\cdot)$, the vote-share maximizing bailout increases monotonically as the firm substitutes foreign for domestic stakeholders. (Voters matter more)
(ii) For a strictly convex $h(\cdot)$, stakeholder substitution has a non-monotonic effect on the subsidy: the vote-share maximizing subsidy strictly increases in V_f under substitution for V_f small. As V_f becomes large, $V_f \to D$, the vote-share maximizer declines in V_f under substitution if $g(\cdot)$ is linear and

$$\frac{h''(x)\,x}{h'(x)} > \frac{V}{D}, \text{ for all } x > 0 \tag{22}$$

Therefore, if the curvature of the disutility function $h(\cdot)$ is sufficiently weak, then Corollary 3.1 (ii) is robust under redistribution with leakage. Nevertheless,

regarding this result in comparison to Proposition (4.1), the independence of the utility function $g(\cdot)$ and the importance of the disutility function $h(\cdot)$ is striking.

For intuition on why the firm size effects differ from the substitution effect, recall that if the firm's size increases by adding additional stakeholder voters, then the taxpaying population, and thus the tax and punishment, are held constant. But the group of agents who punish the politician with their voting behavior becomes smaller due to migration, while the group of stakeholder voters who reward the politician with their votes becomes larger. If, instead, the firm grows due to adding more foreign stakeholder voters, then the group sizes of stakeholder voters and non-stakeholder voters who reward respectively punish via voting stay the same. Still, the monetary transfers change. The subsidy leaks more, reducing the rewards by stakeholder voters, while the taxpayer population grows, thus reducing the tax and the punishment by non-stakeholder voters.

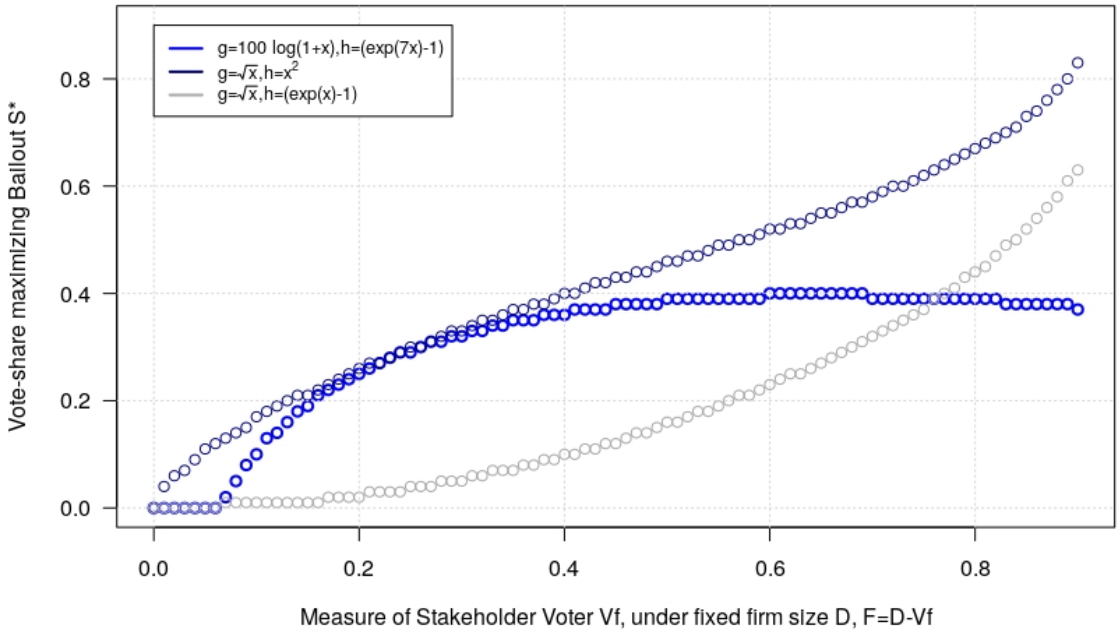

Figure 10: Effects of Stakeholder Substitution on the vote-share maximizing subsidy under Leakage: For fixed firm size $D = 0.9$ and set of voters $V = 1$, as the firm substitutes foreign for domestic stakeholders, the measure of stakeholder voters who can reward the politician with votes increases, but the taxable population declines since F simultaneously goes down. Thus, the tax rises, increasing the punishment by the shrinking group of non-stakeholder voters. The equilibrium subsidy can increase or decline.

Under substitution, the relative group size of interest groups changes *and* the transfer payments, rewards and punishments alter: The disutility function $h(\cdot)$ gains importance under substitution since the tax-paying population declines as the firm substitutes foreign for domestic stakeholders. As a consequence, non-stakeholder voters punish more. At the same time, substitution requires migration from the group of non-stakeholder voters into the group of stakeholder voters such that the size of the group that rewards the politician with their votes becomes larger while the group that punishes by voting against him shrinks. The net reward, however, declines: The pro rata share per stakeholder voter remains constant under substitution since the firm's size is fixed, but due to the tax increase, the after-tax pro rata share and thus the reward go down.

The substitution effect is therefore non-monotonic since the politician trades off the increase in votes due to the growth of the special group that is in his favor versus the increase in punishment and decline in rewards since the taxable population has shrunk. Figure 10 shows that under a convex disutility function, the vote-share maximizer can increase or decline as the firm substitutes foreign for domestic stakeholders. Depending on the specific utility and disutility functions, the growth in the maximizer S_F^* is (piecewise) convex or concave.

4.2 Leakage vs. no Leakage and Closeness to social Optimum

Under a system with leaking benefits, foreigners pay taxes but, in return, have claims on bailouts. The question remains, does the politician under a system with leakage grant bailouts that are closer to the social optimum or not?

Proposition 4.3. *The socially optimal subsidy coincides with the vote-share maximizing subsidy under leakage if the firm does not employ any foreign stakeholders* $\rho = 1$*. If the firm employs foreign stakeholders,* $\rho < 1$*, then the vote-share maximizing subsidy undercuts the socially optimal subsidy,* $S_{soc}^*(\rho) \geq S_F^*(\rho)$*.*

Thus, independently of whether we consider a system with or without leakage, once foreign stakeholders are employed, the politician's vote-share maximizing bailout undercuts the socially optimal bailout. It remains to rank the system with leakage against the system without leakage. When transitioning to a system with leakage, are bailouts closer or further away from the social optimum?

Proposition 4.4 (Leakage versus no Leakage)**.** *If the utility function has a relative risk aversion coefficient greater than one, $-xg''(x)/g/(x) > 1$, then the vote-share maximizing subsidy under leakage exceeds the vote-share maximizer under a tax treaty $\tilde{S}_F^* > S_F^*$. Therefore, under the leakage system, the politician grants bailouts that are closer to the social optimum than under the system without leakage. If instead $-xg''(x)/g'(x) > 1$ does generically not hold, and if g and h are 'close to linear', then $S_F^* > \tilde{S}_F^*$.*

4.3 Foreign Non-stakeholders

In the previous section, all foreign taxpayers were also firm stakeholders. In this section, we will add foreign non-stakeholders, that cannot vote but pay taxes and are not affiliated with the firm. Denote by F the measure of the set of all non-voting and tax-paying foreigners. Let $F_f \leq F$ the measure of foreign stakeholders and let F_{nf} the measure of foreigners that are not stakeholders at the firm, $F = F_f + F_{nf}$. Then the pro rata share under a bailout becomes $c = \frac{S}{V_f+F_f}$ while the tax equals $\tau = \frac{S}{V+F}$. The vote share to the politician at bailout S equals

$$B(S, V_f, V, F_f, F) = \frac{V_f}{V}\, g\left(\frac{S}{V_f + F_f} - \frac{S}{V + F}\right) - \left(1 - \frac{V_f}{V}\right) h\left(\frac{S}{V + F}\right) \quad (23)$$

Denote by $\hat{S}^*(V_f, F_f, F_{nf})$ the vote-share maximizer under domestic stakeholders V_f, foreign stakeholders F_f and foreign non-stakeholders F_{nf}.

Proposition 4.5 (Firm Size Effects under Leakage and Foreign Non-stakeholders)**.** *Assume the politician taxes and pays subsidies to all firm stakeholders. For a fixed measure of foreign stakeholders $F_f > 0$, and a measure of foreign non-stakeholders F_{nf},*
(i) the vote-share maximizing subsidy remains zero for V_f small.
(ii) the vote-share maximizer $\hat{S}^*(V_f, F_f, F_{nf})$ monotonically increases in the measure of stakeholder voters for all $F_f \leq F$.
(iii) Consider an increase in the foreign stakeholder population F_f while holding the total foreign population F constant. The vote-share maximizer increases in F_f if the firm stakeholders' utility function g has relative risk aversion coefficient greater than one, $-xg''(x)/g'(x) > 1$ for all x.

In Proposition 4.5 (iii), an increase in the foreign stakeholder group is supposed to leave the group of foreigners F unaltered. The reason for doing so is to keep the tax unchanged to all agents before taking into account the politician's

equilibrium reaction to a larger group of foreign stakeholders. Since F remains constant, the comparative statics in (iii) require migration from the group of non-stakeholder foreigners F_{nf} into the group of foreign stakeholders F_f. In contrast, in Proposition 4.1 (iv), since the group of non-stakeholder foreigners is empty, an increase in the group of foreign stakeholders requires immigration, thus also changing the tax.

4.4 General Voter Ideology Distribution

The model assumes that voter ideologies are distributed according to a uniform distribution function $\Delta_i \sim U(-b, b)$. The main results are however robust when instead assuming a general, absolutely continuous distribution function $\Delta_i \sim F(\cdot)$. Under a redistributive system where foreigners pay no taxes and have no claims on benefits, the measure of foreigners will, as before, not impact the expected vote share. Therefore, the irrelevance result 3.1 holds under a general $F(\cdot)$. To the social planner, the ideology distribution does not matter since he values all agents equally. When changing to a redistributive system where foreigners pay taxes and receive shares of the bailout, the measure of foreign stakeholders impacts monetary transfers. Therefore, as in Proposition 4.1, when employing more or fewer foreign stakeholders, the vote-share maximizing bailout will change. The concrete change will then depend on both the curvature of the (dis)utility functions and the distribution $F(\cdot)$.

5 Regulation

The literature on optimal bailout provision would typically proceed with discussing what sort of regulation to impose for bailouts to approach the social optimum. Such regulation is tricky here. We know from Proposition 3.2 and 4.3 that the politician sets the socially optimal bailout if and only if all firm stakeholders are domestic. Intuitively, only in this special case can all firm stakeholders vote to reward the politician for the bailout. A regulation which, in case of a firm failure, assigns voting rights to foreign stakeholders, e.g., grants citizenship, seems drastic. Also, a regulation that requires politicians to adopt the bailout size to the total measure of all stakeholders is cursed to fail since such regulation either increases the tax to non-stakeholder voters or reduces the pro rata share to stakeholder voters or both, resulting in more punishment, less reward, and ultimately a reduced vote-share.

6 Conclusion

When a firm fails, and a politician decides on a bailout, to what extent does the vote-share maximizing bailout depend on the voter-concentration among all firm stakeholders? When keeping the firm's size fixed and substituting foreign stakeholders without voting rights for domestic stakeholders with voting rights, will the politician set the same bailout? I analyze these questions in a probabilistic voting model. Domestic stakeholders reward the politician via vote-shading for bailouts while voters that are not affiliated with the firm punish the politician for the tax, which they are required to pay for financing the bailout. I consider two redistributive systems. In the first system, foreign firm stakeholders are not taxed and have no claim on the bailout. In that case, the voter-concentration is a sufficient statistic for the vote-share maximizing bailout. If the firm grows by employing more foreign stakeholders, bailouts remain constant since the measure of voters at the firm level is unchanged. In a second system, foreign stakeholders are eligible to receive a share of the bailout but also pay taxes (greencard holders). The vote-share maximizing bailout remains increasing as the firm employs more agents with voting rights. But the bailout now also alters as the firm employs more foreign stakeholders, albeit their lack of voting rights. Their employment impacts the electorate by changing the extent of vote-shading via altered monetary transfers (benefits and taxes). The results are in contrast to the too-big-to-fail literature in finance. Vote-share maximizing bailouts equal socially optimal bailouts only if all stakeholders are domestic and otherwise undercut the social optimum.

7 Appendix

7.1 Proofs: Redistribution without Taxation of Foreigners

Proof. [Lemma 3.1] For given V, V_f and $v_D \equiv \frac{V_f}{V}$, the social planner chooses S_F^*, by this setting $c(S) = \frac{S}{V_f}$ and $\tau(S) = \frac{S}{V}$. Denote by $\frac{\partial c}{\partial V_f}$ the partial derivative of c by V_f, holding S fixed. The first order conditions of the politician with regard to S are

$$\begin{aligned}\frac{\partial A}{\partial S} &= v_D\, f_\Delta(g(c-\tau))\, g'(c-\tau) \left(\frac{\partial(c(S)-\tau(S)))}{\partial S}\right) - (1-v_D)\, f_\Delta(-h(\tau(S)))\, h'(\tau)\, \frac{\partial \tau}{\partial S} \\ &= v_D\, g'(c-\tau) \left(\frac{\partial(c(S)-\tau(S)))}{\partial S}\right) - (1-v_D)\, h'(\tau)\, \frac{\partial \tau}{\partial S} = 0 \end{aligned} \tag{24}$$

where we have used that f_Δ is the uniform density, satisfying $f_\Delta(V^D) = f_\Delta(-V^{ND}) = 1$ by $-b \leq -V^{ND} \leq V^D \leq b$ for all S. We next use the identity $v_D \left(\frac{\partial(c(S)-\tau(S)))}{\partial S}\right) = (1-v_D)\frac{\partial \tau}{\partial S}$, to further simplify the first order condition to

$$0 = \frac{1}{V}\,(1-v_D) \left(g'(c-\tau) - h'(\tau)\right) \tag{25}$$

Since $\frac{1}{V}\,(1-v_D)$ is always positive for $V_f < V$, for the characterization of an interior vote-share maximizer S_F^* it is sufficient to analyze the zeroes of the function

$$\hat{A}(S) \equiv g'(c(S)-\tau(S)) - h'(\tau(S)) \tag{26}$$

First see that since the tax is independent of V_f, it holds

$$\frac{\partial}{\partial V_f}\hat{A}(S) = \frac{\partial c}{\partial V_f} g''(c-\tau) > 0 \tag{27}$$

since g is concave and since the pro rata share declines in the measure of agents who have a claim on the subsidy. Next, see that the vote-share is concave in S,

$$\frac{\partial}{\partial S}\hat{A}(S) = \left(\frac{\partial c}{\partial S} - \frac{\partial \tau}{\partial S}\right) g''(c-\tau) - \frac{\partial \tau}{\partial S}\, h''(\tau) < 0. \tag{28}$$

The derivative (28) is negative since h is convex. Finally, by the implicit function theorem, since $\hat{A}(S)$ increases in V_f and declines in S, every interior maximizer $S_F^*(V_f)$ must be increasing in V_f, $\frac{\partial S_F^*}{\partial V_f} = -\left(\frac{\partial \hat{A}}{\partial V_f} / \frac{\partial \hat{A}}{\partial S}\right) > 0$. Last, by concavity of the vote-share in S, if there exists an interior vote-share maximizing subsidy that satisfies the first order conditions, then this maximizer is the global vote-

share maximizer. If there exists no interior maximizer, then the maximizer is at either of the boundaries. Yet, by $\frac{\partial}{\partial V_f}\hat{A}(S) > 0$, the global maximizer weakly increases in V_f. In particular, once the global maximizer reaches the right boundary, it stays there when further increasing V_f. Now, consider $V_f \to 0$. Then $A(S) \to -h(\tau(S))$. Since h and $\tau(S)$ are increasing in S, the vote-share is maximized at $S = 0$.

For (ii), see that the vote-share characterizing first order condition (26) is independent of the measure of foreign stakeholders, since the politician only cares about voters. Therefore, the vote-share maximizing subsidy is constant in the total stake size D, when the increase in the stake is organized exclusively by employing more foreign stakeholders.

On (iii), for a fixed stake size D, and the identity $V_f = \rho D$, an increase in the voter-concentration causes an increase in the measure of stakeholder voters. Thus, by part (i), S_F^* increases in the voter-concentration ρ. □

Proof. [Proposition 3.2] We have proven result (i) and (iii) of Proposition 3.2 in the main text. For result (ii), we want to analyze how welfare alters in firm (stake) size D.

There are two ways how the firm size can grow, either by employing more foreign stakeholders F or by employing more domestic stakeholders V_f. The latte requires a decline in the population of non-stakeholder voters since the set of all voters is fixed. We analyze changes in F first. In either case, socially optimal bail-out, when interior, is determined via the first order condition

$$0 = \frac{1}{V_{nf}+D}\, g'\Big(\frac{S}{D} - \frac{S}{D+V_{nf}}\Big)\Big(1 - \frac{D}{D+V_{nf}}\Big) - \frac{1}{V_{nf}+D} h'(\tau_s(S))\Big(\frac{V_{nf}}{D+V_{nf}}\Big) \tag{29}$$

which simplifies to the implicit equation,

$$\hat{F}_{soc}(S, F, V_f) \equiv g'\Big(\frac{S}{V_f+F} - \frac{S}{V+F}\Big) - h'\Big(\frac{S}{V+F}\Big) = 0 \tag{30}$$

where we have substituted for $D = V_f + F$ and for $V_{nf} = V - V_f$ to make the dependence on the different stakeholder groups clear. The socially optimal subsidy S_{soc}^* is a zero of $\hat{F}$ for a given stake D. Then, welfare is concave in the subsidy by concavity of g and convexity of h,

$$\frac{\partial}{\partial S}\hat{F}_{soc}(S, D) = g''\Big(\frac{S}{V_f+F} - \frac{S}{V+F}\Big)\Big(\frac{1}{V_f+F} - \frac{1}{V+F}\Big) - h''\Big(\frac{S}{V+F}\Big)\Big(\frac{1}{V+F}\Big) < 0 \tag{31}$$

A change in $\hat{F}_{soc}$ due to a change in F equals

$$\frac{\partial}{\partial F}\hat{F}_{soc}(S,F,V_f) = g''\Big(\frac{S}{V_f+F}-\frac{S}{V+F}\Big)\Big(\frac{S}{(V+F)^2}-\frac{S}{(V_f+F)^2}\Big) \tag{32}$$

$$+\,h''\Big(\frac{S}{V+F}\Big)\Big(\frac{S}{(V+F)^2}\Big) > 0 \tag{33}$$

since g is concave, h is convex and $V > V_f$. Therefore, the socially optimal subsidy increases in the measure of foreign stakeholders by the implicit function theorem, $\frac{\partial S^*_{soc}}{\partial F} = -\Big(\frac{\partial}{\partial F}\hat{F}\Big)/\Big(\frac{\partial}{\partial S}\hat{F}\Big) > 0$. Now consider an increase in firm size due to an increase in the measure of domestic stakeholders. Such a change leaves the tax constant. Therefore, a change in $\hat{F}_{soc}$ due to a change in V_f

$$\frac{\partial}{\partial V_f}\hat{F}_{soc}(S,F,V_f) = -g''\Big(\frac{S}{V_f+F}-\frac{S}{V+F}\Big)\Big(\frac{S}{(V_f+F)^2}\Big) > 0 \tag{34}$$

Thus, again by the implicit function theorem, the socially optimal subsidy increases in the measure of domestic stakeholders. To summarize, an increase in the firm's size D either by employing more foreign or domestic stakeholders always increases the socially optimal subsidy.

See however that the rates at which the subsidy changes under a foreign as opposed to a domestic increase in the stakeholder population differ, and can generically not be ranked against one another. As a consequence, the socially optimal bailout depends and changes with the voter concentration: An increase in the voter concentration when keeping the firm's size fixed at D, implies a substitution of foreign for domestic stakeholders and thus a decline in the taxable population. Rewriting (30) yields

$$\hat{F}_{soc}(S,D,\rho) \equiv g'\Big(\frac{S}{D}-\frac{S}{V+(1-\rho)D}\Big) - h'\Big(\frac{S}{V+(1-\rho)D}\Big) = 0 \tag{35}$$

A change of F_{soc} in the voter-concentration equals

$$\frac{\partial}{\partial \rho}\hat{F}_{soc}(S,D,\rho) = -\frac{SD}{(V+(1-\rho)D)^2}\Big(g''\Big(\frac{S}{D}-\frac{S}{V+(1-\rho)D}\Big)+h''\Big(\frac{S}{V+(1-\rho)D}\Big)\Big) \tag{36}$$

The sign of the bracket is not determined. If and only if $g''\Big(\frac{S}{D}-\frac{S}{V+(1-\rho)D}\Big) + h''\Big(\frac{S}{V+(1-\rho)D}\Big) > 0$, then $\frac{\partial}{\partial \rho}F_{soc} < 0$ and via the implicit function theorem, the socially optimal subsidy declines in the voter-concentration, i.e. declines as the firm substitutes foreign for domestic stakeholders.

(iv) Next, we want to show that at every voter concentration $\rho \in [0,1]$, the socially optimal bailout weakly exceeds the vote-share maximizing bailout. From the main text, we already know that for $\rho = 1$, the vote-share maximizing and the socially optimal bailout coincide. Now consider $\rho = 0$. Then $V_f = 0$ and clearly, the politician sets $S_F^*(0) = 0$. Since zero is the lower bound for a bailout, it follows $S_{soc}^*(0) \geq S_F^*(0)$. For the remainder of the proof, consider therefore $\rho \in (0,1)$. If the vote-share maximizer is at the left boundary, $S_F^*(\rho) = 0$, then as before, we must have $S_{soc}^*(0) \geq S_F^*(0)$.

For the last step, see that for every $D < V$ and $\rho \in (0,1)$, it holds

$$\frac{1}{\rho D} - \frac{1}{V} > \frac{1}{D} - \frac{1}{V + (1-\rho)D} \tag{37}$$

If $S_F^*(\rho)$ is interior or at the right boundary, by the first order conditions for a vote-share maximizer it must hold, with $V_f = \rho D$

$$0 \leq \hat{A}(S_F^*(\rho)) \equiv g'\Big(S_F^*\Big(\frac{1}{\rho D} - \frac{1}{V}\Big)\Big) - h'\Big(S_F^*\Big(\frac{1}{V}\Big)\Big) \tag{38}$$

$$< g'\Big(S_F^*\Big(\frac{1}{D} - \frac{1}{V + (1-\rho)D}\Big)\Big) - h'\Big(S_F^*\Big(\frac{1}{V + (1-\rho)D}\Big)\Big) \equiv \hat{F}_{soc}(S_F^*, \rho) \tag{39}$$

where in the second step, we have used the concavity of g, the convexity of h, and (37). But by (31), we know that $\hat{F}_{soc}$ monotonically declines in S. The inequality $0 \leq \hat{F}_{soc}(S_F^*, \rho)$ therefore already rules out that $S_{soc}^*(\rho)$ lies at the left boundary. If $\hat{F}_{soc}(S, \rho) \geq 0$ for all S, then $S_{soc}^*(\rho)$ is at the right boundary and thus satisfies $S_{soc}^*(\rho) \geq S_F^*(\rho)$. If $\hat{F}_{soc}(S, \rho) = 0$ for some S, then we know this S must equal $S_{soc}^*(\rho)$ and again, since $\hat{F}_{soc}(S, \rho)$ is decreasing in S while also $\hat{F}_{soc}(S_F^*, \rho) \geq 0$, it again must be $\hat{F}_{soc}(S, \rho) \geq S_F^*(\rho)$.

□

7.2 Proofs: Redistribution with Leakage

Proof. [Proposition 4.1] Fix the set of voters V, and let $F > 0$ an abitrary measure of foreign stakeholders. For a given measure of stakeholder voters $V_f \in (0, V)$, consider the first derivative of the vote-share

$$\frac{\partial}{\partial S}\tilde{A}(S) = \frac{1}{V}\left[g'\Big(\frac{S}{V_F + F} - \frac{S}{V + F}\Big)\Big(\frac{V_f}{V_F + F} - \frac{V_f}{V + F}\Big) - h'\Big(\frac{S}{V + F}\Big)\frac{V - V_f}{V + F}\right] \tag{40}$$

First, see that the vote-share (19) is continuous in $V_f = 0$, and that in that

case, $\tilde{A}(S) = -h(\frac{S}{V+F})$. Since h is increasing, the vote-share clearly has its maximizer in $S = 0$. Moreover, $\frac{\partial}{\partial S}\tilde{A}(S) < 0$ as $V_f \to 0$ becomes small. Thus $S_F^* = 0$ also for small V_f. The vote-share is concave in S since g is concave, h is convex, $V_f \subset V$ and

$$\frac{\partial^2}{\partial S^2}\tilde{A}(S) = \frac{1}{V}\left[g''(\cdot)V_f\left(\frac{1}{V_f+F} - \frac{1}{V+F}\right)^2 - h''(\cdot)\frac{V-V_f}{(V+F)^2}\right] < 0 \tag{41}$$

Therefore, for $V_f > 0$, the vote-share can have an interior maximizer S that satisfies

$$g'\Big(\frac{S}{V_F+F} - \frac{S}{V+F}\Big)\Big(\frac{V_f}{V_F+F} - \frac{V_f}{V+F}\Big) - h'\Big(\frac{S}{V+F}\Big)\Big(\frac{V}{V+F} - \frac{V_f}{V+F}\Big) = 0 \tag{42}$$

To see how this maximizer behaves, since the tax is independent of V_f, the cross-derivative satisfies

$$\frac{\partial}{\partial V_f}\frac{\partial}{\partial S}\tilde{A}(S) = \frac{1}{V}\left[g''(\cdot)\left(\frac{V_f}{V_F+F} - \frac{V_f}{V+F}\right)\Big(-\frac{S}{(V_f+F)^2}\Big) + h'\Big(\frac{S}{V+F}\Big)\frac{1}{V+F}\right. \tag{43}$$

$$\left. + g'(\cdot)\left(\frac{F}{(V_f+F)^2} - \frac{1}{V+F}\right)\right] \tag{44}$$

Plugging in the equilibrium condition (42) to replace the second term in (43), yields

$$\frac{\partial}{\partial V_f}\frac{\partial}{\partial S}\tilde{A}(S) = \frac{1}{V}\left[g''(\cdot)\left(\frac{V_f}{V_F+F} - \frac{V_f}{V+F}\right)\Big(-\frac{S}{(V_f+F)^2}\Big)\right. \tag{45}$$

$$\left. + g'(\cdot)\left(\frac{V_f}{V-V_f}\left(\frac{1}{V_F+F} - \frac{1}{V+F}\right) + \left(\frac{F}{(V_f+F)^2} - \frac{1}{V+F}\right)\right)\right] \tag{46}$$

By concavity of g, the first term is positive. We need to determine the sign of the large bracket in the second term. Multiplying with $(V - V_f)$, we see, the bracket is positive if and only if

$$V_f\,\frac{1}{V_f+F} + (V-V_f)\,\frac{F}{(V_f+F)^2} \geq \frac{V}{V+F} \tag{47}$$

The term on the left hand side of (47) is monotonically decreasing in V_f, takes the value $V/F > V/(V+F)$ in the point $V_f = 0$ and takes the value $\frac{V}{V+F}$ in $V_f = V$. Thus, (47) holds for all $V_f \in [0, V]$, and the cross-derivative (45) is

always positive. Together with the concavity of the vote-share, by the implicit function theorem, the vote-share maximizing subsidy increases in V_f, and increases strictly whenever interior.
For (iv), using the short-cuts $x = \frac{S}{V_F+F} - \frac{S}{V+F} > 0$ and $y = \frac{S}{V+F} > 0$, then

$$\frac{\partial}{\partial F}\frac{\partial}{\partial S}\tilde{A}(S) = \frac{1}{V}\Big[V_f\left(\frac{1}{(V+F)^2} - \frac{1}{(V_f+F)^2}\right)\Big(g''(x)\,x + g'(x)\Big) + \frac{V-V_f}{(V+F)^2}\Big(h''(y)\;y + h'(y)\Big)\Big] \tag{48}$$

Since h is increasing and convex, the last term is always positive. Thus, if $g''(x)\,x + g'(x) \leq 0$ for all x, the cross-derivative (48) is positive, and by concavity of the vote-share in the subsidy and the implicit function theorem, the vote-share maximizer monotonically increases in the measure of foreign stakeholders when holding the measure of domestic stakeholders fixed.

Now suppose $g''(x)\,x + g'(x) > 0$: Using the equilibrium equation (42), we know

$$g'\Big(x\Big) = h'\Big(y\Big)\,\frac{\left(\frac{V-V_f}{V+F}\right)}{V_f\left(\frac{1}{V_F+F} - \frac{1}{V+F}\right)} = h'\Big(y\Big)\,\frac{V_f+F}{V_f} \tag{49}$$

Plugging in for $g'(x)$ and simplifying

$$\frac{\partial}{\partial F}\frac{\partial}{\partial S}\tilde{A}(S) = \frac{1}{V}\Big[V_f\left(\frac{1}{(V+F)^2} - \frac{1}{(V_f+F)^2}\right)g''(x)\,x + \frac{V-V_f}{(V+F)^2}\;h''(y)\;y \tag{50}$$

$$- h'(y)\;\frac{(V-V_f)}{(V_f+F)(V+F)}\Big] \tag{51}$$

While the first two terms are positive, the last term is negative. If for instance, g and h are 'close to linear', then g'' and h'' are close to zero, $g''(x)\,x + g'(x) > 0$ holds, the cross-derivative is negative, and the vote-share maximizer monotonically declines in F. Generically, there is non-monotonicity of the cross-derivative in F. □

Proof. [Proposition 4.2] The first order condition for the vote-share maximizing subsidy is given by (42). The concavity of the vote-share in the subsidy (41) remains to hold under substitution. For determining the cross-derivative under stakeholder substitution it is helpful to rewrite (42) as

$$\frac{\partial}{\partial S}\tilde{A}(S) = \frac{1}{V}\Big[g'\Big(\frac{S}{D} - \frac{S}{V+F_D(V_f)}\Big)\Big(\frac{V_f}{D} - \frac{V_f}{V+F_D(V_f)}\Big) - h'\Big(\frac{S}{V+F_D(V_f)}\Big)\;\frac{V-V_f}{V+F_D(V_f)}\Big] = 0 \tag{52}$$

where $F_D(V_F)$ denotes the measure of foreign stakeholders required for a given measure of domestic stakeholders V_f such that the total measure of stakeholders is constant at $D = V_f + F_D(V_f)$. With $F'(V_f) = -1 < 0$, $V + F(V_f) + F'(V_f)(V - V_f) = \bar{D} > 0$ and $V + F(V_f) - F'(V_f)V_f = V + \bar{D}$, we obtain

$$\frac{\partial}{\partial V_f}\frac{\partial}{\partial S}\tilde{A}(S) = \frac{1}{V}\Big[- g''(\cdot)\, SV_f \left(\frac{1}{D} - \frac{1}{V + F(V_f)}\right)\frac{1}{(V + F(V_f))^2} \tag{53}$$

$$+ g'(\cdot)\left(\frac{1}{D} - \frac{V + D}{(V + D - V_f)^2}\right) \tag{54}$$

$$- h''\Big(\,\cdot\,\Big)\,\frac{S(V - V_f)}{V + F(V_f)}\frac{1}{(V + F(V_f))^2} + h'(\cdot)\,\frac{\bar{D}}{(V + F(V_f))^2}\Big] \tag{55}$$

Solving the equilibrium condition (52) for g',

$$g'(\cdot) = h'(\cdot)\,\frac{\frac{V - V_f}{V + D - V_f}}{V_f\left(\frac{1}{D} - \frac{1}{V + D - V_f}\right)} = h'(\cdot)\,\frac{D}{V_f} \tag{56}$$

and plugging into the cross-derivative yields

$$\frac{\partial}{\partial V_f}\frac{\partial}{\partial S}\tilde{A}(S) = \frac{1}{V}\frac{1}{(V + F(V_f))^2}\Big[- g''(\cdot)\, SV_f \left(\frac{1}{D} - \frac{1}{V + F(V_f)}\right) - h''\Big(\,\cdot\,\Big)\,\frac{S(V - V_f)}{V + F(V_f)}$$

$$+ h'(\cdot)\,\frac{1}{V_f}\Big((V - V_f)^2 + D(V - V_f)\Big)\Big] \tag{57}$$

Since g is concave, h is convex and by $(V - V_f)^2 + D(V - V_f) > 0$, the first term is positive, the second term is negative, and the last term (57) is positive.
(i) Therefore, independently of $g(\cdot)$, if $h(\cdot)$ is close to linear, then the cross-derivative is positive. Thus, by concavity of the vote-share in the subsidy, and the implicit function theorem, the vote-share maximizer monotonically increases as the firm substitutes foreign stakeholder for stakeholder voters while keeping her size constant.
(ii) For a general convex function $h(\cdot)$, rewrite

$$\frac{\partial}{\partial V_f}\frac{\partial}{\partial S}\tilde{A}(S) = \frac{1}{V}\frac{1}{(V + F(V_f))^2}\Big[- g''(\cdot)\, SV_f \left(\frac{1}{D} - \frac{1}{V + F(V_f)}\right) \tag{58}$$

$$- (V - V_f)\left(h''(\cdot)\,\frac{S}{V + F(V_f)} - h'(\cdot)\,\frac{V + F(V_f)}{V_f}\right)\Big] \tag{59}$$

First see that independently of h and g, as $V_f \to 0$, $\frac{\partial}{\partial V_f}\frac{\partial}{\partial S}\tilde{A}(S) > 0$: For

$V_f \to 0$, $\frac{S}{V+F(V_f)} \to \frac{S}{V+D}$ constant, thus also $h'(\frac{S}{V+D})$ and $h''(\frac{S}{V+D})$ take a constant value. But $\frac{V+F(V_f)}{V_f} \to \infty$. Thus,

$$-(V-V_f)\left(h''(\cdot)\,\frac{S}{V+F(V_f)} - h'(\cdot)\,\frac{V+F(V_f)}{V_f}\right)\Big] \to +\infty \tag{60}$$

while

$$-g''(\cdot)\,SV_f\left(\frac{1}{D} - \frac{1}{V+F(V_f)}\right) \to 0. \tag{61}$$

Thus, $\lim_{V_f\to 0} \frac{\partial}{\partial V_f}\frac{\partial}{\partial S}\tilde{A}(S) > 0$ and the vote-share maximizer $\hat{S}_F^*(V_f)$ increases in V_f under stakeholder substitution for V_f small.

For V_f away from zero: We want to show that the vote-share maximizer can decline in V_f under substitution. Assume g is close to linear such that g'' is close to zero. Then $\frac{\partial}{\partial V_f}\frac{\partial}{\partial S}\tilde{A}(S) < 0$ if and only if

$$h''(\frac{S}{V+F(V_f)})\,\frac{S}{V+F(V_f)} - h'(\frac{S}{V+F(V_f)})\,\frac{V+F(V_f)}{V_f} > 0 \tag{62}$$

Define $Z(V_f) := \frac{V+F(V_f)}{V_f} = \frac{V+D}{V_f} - 1$ and see that for all $V_f \leq \min(D,V)$, it holds $Z(V_f) > 1$ by $D < V$ and $\frac{V+D}{2} > V_f$. The function $Z(V_f)$ is continuous and monotonically decreasing in V_f, and reaches its minimum V/D as $V_f \to D$. Therefore, a convex function $h(\cdot)$ that satisfies

$$\frac{h''(x)x}{h'(x)} > \frac{V}{D}, \text{ for all } x > 0 \tag{63}$$

will satisfy (62) for V_f close to D. To summarize, we have $\lim_{V_f\to D}\frac{\partial}{\partial V_f}\frac{\partial}{\partial S}\tilde{A}(S) < 0$ for g close to linear and $\frac{h''(x)x}{h'(x)} > \frac{V}{D}$, for all $x > 0$. By the implicit function theorem, the vote-share maximizer therefore declines in V_f under substitution for V_f close to D.

□

Proof. [Proposition 4.3] The vote-share at bailout D equals

$$\tilde{A}(S) = \frac{V_f}{V}\,g\Big(\frac{S}{V_f+(1-\rho)D} - \frac{S}{V+(1-\rho)D}\Big) - (1-\frac{V_f}{V})\,h\Big(\frac{S}{V+(1-\rho)D}\Big) \tag{64}$$

The social planner equally cares for foreign and domestic stakeholders. Therefore, the tax formula and the pro-rata share are the same as under vote-share maximization. But the welfare weights need adjustment since they depend on the measure of foreign stakeholders. Define the welfare weight on stakeholders

as

$$\alpha(y) := \frac{V_f + y}{V + y} \tag{65}$$

where $y = (1-\rho)D$, and see that $y > 0$ only if $\rho < 1$. Then Utilitarian welfare is defined as

$$\tilde{W}(S, y) = \alpha(y)\; g\Big(\frac{S}{V_f + (1-\rho)D} - \frac{S}{V + (1-\rho)D}\Big) - \Big(1 - \alpha(y)\Big)\; h\Big(\frac{S}{V + (1-\rho)D}\Big) \tag{66}$$

Observe that welfare maximization coincides with vote-share maximization for $y = 0$,

$$\tilde{W}(S, 0) = \tilde{A}(S) \tag{67}$$

An interior socially optimal subsidy satisfies

$$\begin{aligned}\frac{\partial}{\partial S}\tilde{W}(S, y) = \alpha(y)\; g'\Big(\frac{S}{V_f + (1-\rho)D} - \frac{S}{V_+(1-\rho)D}\Big)\Big(\frac{1}{V_f + (1-\rho)D} - \frac{1}{V + (1-\rho)D}\Big) \\ - (1 - \alpha(y))\; h'\Big(\frac{S}{V + (1-\rho)D}\Big)\Big(\frac{1}{V + (1-\rho)D}\Big) = 0\end{aligned} \tag{68}$$

and can exist because welfare is concave in the subsidy by concavity of g and convexity of h,

$$\begin{aligned}\frac{\partial^2}{\partial S^2}\tilde{W}(S, y) = \alpha(y)\; g''\Big(\frac{S}{V_f + (1-\rho)D} - \frac{S}{V_+(1-\rho)D}\Big)\Big(\frac{1}{V_f + (1-\rho)D} - \frac{1}{V + (1-\rho)D}\Big)^2 \\ - (1 - \alpha(y))\; h''\Big(\frac{S}{V + (1-\rho)D}\Big)\Big(\frac{1}{V + (1-\rho)D}\Big)^2 < 0.\end{aligned} \tag{69}$$

The partial derivative of equation (68) satisfies

$$\begin{aligned}\frac{\partial}{\partial y}\frac{\partial}{\partial S}\tilde{W}(S, y) = \alpha'(y)\; g'\Big(\frac{S}{V_f + (1-\rho)D} - \frac{S}{V_+(1-\rho)D}\Big)\Big(\frac{1}{V_f + (1-\rho)D} - \frac{1}{V + (1-\rho)D}\Big) \\ + \alpha'(y)\; h'\Big(\frac{S}{V + (1-\rho)D}\Big)\Big(\frac{1}{V + (1-\rho)D}\Big) > 0\end{aligned} \tag{70}$$

since $\alpha'(y) = \frac{V - V_f}{(V+y)^2} > 0$. Thus, by the implicit function theorem, the socially optimal subsidy increases in y, $\frac{\partial S^*_{soc}}{\partial y} = -\Big(\frac{\partial}{\partial y}\frac{\partial}{\partial S}\Big)/\Big(\frac{\partial^2}{\partial S^2}\tilde{W}\Big) > 0$.

To compare the relative size of the socially optimal subsidy with the vote-share maximizing subsidy, fix a measure of foreign stakeholders $y > 0$. Assume that both the vote-share maximizer and the socially optimal subsidy are interior at y. Name the according value of the socially optimal subsidy $S^*_{soc,y} = S^*_{soc}(y)$

at y. Then, with (68),

$$0 = \frac{\partial}{\partial S}\tilde{W}(S^*_{soc,y}, y) > \frac{\partial}{\partial S}\tilde{W}(S^*_{soc,y}, 0) = \frac{\partial}{\partial S}\tilde{A}(S^*_{soc,y}) \tag{71}$$

where the strict inequality uses (70) and then (67). The interior vote-share maximizing subsidy $S^*_F(y)$, in contrast, must satisfy the first order condition $\frac{\partial}{\partial S}\tilde{A}(S^*_F, y) = 0$, see (42). Since the vote-share $\tilde{A}$ is concave in S by (41), it follows $S^*_{soc}(y) > S^*_F(y)$, and since y was arbitrary, $S^*_{soc}(y) > S^*_F(y)$ for all $y \geq 0$, whenever both maximizers are interior.

By an analogous argument, if the social optimum at $y > 0$ is at the left boundary $S^*_{soc}(y) = 0$, then $0 \geq \frac{\partial}{\partial S}\tilde{W}(0, y) > \frac{\partial}{\partial S}\tilde{A}(0)$, and concavity of $\tilde{A}$ in S demands $S^*_F(y) = S^*_{soc}(y) = 0$. If S^*_{soc} is at the right boundary instead, then S^*_F can only be smaller, $S^*_F(y) \leq S^*_{soc}(y)$. Moreover, $S^*_F = S^*_{soc}$ in $y = 0$ since then welfare and the vote-share coincide. Thus, it holds $S^*_{soc}(y) \geq S^*_F(y)$ for all $y \geq 0$. □

Proof. [Proposition 4.4] Let $S, F > 0$. Consider the partial derivative of the vote-share under leakage $\frac{\partial}{\partial S}\tilde{A}(S, F)$. Observe that for $F = 0$, any $S > 0$ satisfies $\frac{\partial}{\partial S}A = \frac{\partial}{\partial S}\tilde{A}(S, 0)$, where $\frac{\partial}{\partial S}A$ is the partial derivative of the vote-share absent leakage, i.e. under a tax treaty where foreigners receive no benefits. The interior vote-share maximizer under no leakage S^*_F thus satisfies

$$0 = \frac{\partial}{\partial S}A(S^*_F) = \frac{\partial}{\partial S}\tilde{A}(S^*_F, 0) \tag{72}$$

If the utility function has a relative risk aversion coefficient greater than one, $-xg''(x)/g/(x) > 1$, then by the proof to Proposition 4.1, the cross-derivative $\frac{\partial}{\partial F}\frac{\partial}{\partial S}\tilde{A}(S, F)$ is positive for all $S, F > 0$, implying $\frac{\partial}{\partial S}\tilde{A}(S^*_F, 0) < \frac{\partial}{\partial S}\tilde{A}(S^*_F, F)$, and therefore $0 < \frac{\partial}{\partial S}\tilde{A}(S^*_F, F)$. Consequently, $S^*_F < \tilde{S}^*_F$ by concavity of the vote-share $\tilde{A}$ in S and since the interior vote-share maximizer under leakage satisfies $0 = \frac{\partial}{\partial S}\tilde{A}(\tilde{S}^*_F, F)$. Thus, by Proposition 4.3, under leakage the bailout is closer to the social optimum than under no leakage.

If on the other hand, $-xg''(x)/g'(x) > 1$ does generically not hold, and if g and h are 'close to linear', then again by the proof to Proposition 4.1, the cross-derivative $\frac{\partial}{\partial F}\frac{\partial}{\partial S}\tilde{A}(S, F)$ is negative for all F and by the same argument, $S^*_F > \tilde{S}^*_F$. □

Proof. [Proposition 4.5] (i) This follows directly, by seeing that for $V_f \to 0$, $B \to -h\left(\frac{S}{V+F}\right)$. Since h is strictly increasing, the vote-share is maximized for

$S = 0$.

(ii) The proof follows along the proof in Proposition 4.1. The first order condition for the vote-share maximizer satisfies

$$\frac{\partial B}{\partial S} = \frac{V_f}{V}\, g'\left(\frac{S}{V_f+F_f} - \frac{S}{V+F}\right)\left(\frac{1}{V_f+F_f} - \frac{1}{V+F}\right) - \left(1-\frac{V_f}{V}\right) h'\left(\frac{S}{V+F}\right)\frac{1}{V+F} = 0 \tag{73}$$

By the same steps as in Proposition 4.1, B is concave in S. By solving the equilibrium condition for an interior maximizer, (73), we see that

$$h'(\frac{1}{V+F})\frac{1}{V+F} = g'\left(\frac{S}{V_f+F_f} - \frac{S}{V+F}\right)\frac{V_f}{V-V_f}\left(\frac{1}{V_f+F_f} - \frac{1}{V+F}\right)$$

. Calculating the cross-derivative and then replacing $h'(\frac{1}{V+F})\frac{1}{V+F}$ yields

$$\frac{\partial}{\partial V_f}\frac{\partial B}{\partial S} = \frac{1}{V}\Big[g''(\cdot)\left(-\frac{S}{(V_f+F_f)^2}\right)\left(\frac{V_f}{V_f+F_f} - \frac{V_f}{V+F}\right) \tag{74}$$

$$+\, g'(\cdot)\left(\frac{F_f}{(F_f+V_f)^2} - \frac{1}{V+F} + \frac{V_f}{V-V_f}\left(\frac{1}{V_f+F_f} - \frac{1}{V+F}\right)\right) \tag{75}$$

By concavity of g, the first term is positive. The second term is positive since the bracket can be shown to be positive. Multiplying the bracket by $V - V_f > 0$, the bracket is positive if and only if for all $V_f \in [0, V]$

$$(V-V_f)\frac{F_f}{(F_f+V_f)^2} + \frac{V_f}{V_f+F_f} > \frac{V}{V+F} \tag{76}$$

In $V_f = 0$, the left hand side equals $\frac{V}{F_f} > \frac{V}{V+F}$ which is true by $F_f \leq F$. For $V_f = V$, the left hand side equals $\frac{V}{V+F_f} > \frac{V}{V+F}$ which holds again by $F_f \leq F$. Last, the left hand side of (76) monotonically declines in V_f. Therefore, the cross-derivative is positive for all $V_f \in [0, V]$ and all $F_f \leq F$. By concavity of B in S and the implicit function theorem, the vote-share maximizer remains monotonically increasing in V_f under foreign non-stakeholders.

(iii) A change in F_f leaves F unchanged. Set $x = \frac{S}{V_f+F_f} - \frac{S}{V+F}$. Then,

$$\frac{\partial}{\partial F_f}\frac{\partial B}{\partial S} = \frac{V_f}{V}\Big(-\frac{1}{(V_f+F_f)^2}\Big)\Big(g''(x)\,x + g'(x)\Big) \tag{77}$$

Therefore, $\frac{\partial}{\partial F_f}\frac{\partial B}{\partial S} > 0$ if $g''(x)\,x + g'(x) < 0$ for all $x > 0$. Via the concavity of B in S and the implicit function theorem, the vote-share maximizer monotonically increases in F_f if and only if $g''(x)\,x + g'(x) < 0$ for all $x > 0$. □

References

Daron Acemoglu and James A Robinson. *Economic origins of dictatorship and democracy*. Cambridge University Press, 2005.

Viral V. Acharya and Tanju Yorulmazer. Too many to fail—an analysis of time-inconsistency in bank closure policies. *Journal of Financial Intermediation*, 16:1 – 31, 2007. ISSN 1042-9573.

Philippe Aghion and Patrick Bolton. Government domestic debt and the risk of default: a political-economic model of the strategic role of debt. *Public debt management: theory and history*, 315, 1990.

Alberto Alesina and Guido Tabellini. Voting on the budget deficit. Technical report, National Bureau of Economic Research, 1988.

Alberto Alesina and Guido Tabellini. A positive theory of fiscal deficits and government debt. *The Review of Economic Studies*, 57(3):403–414, 1990.

Franklin Allen and Douglas Gale. Financial contagion. *Journal of political economy*, 108(1):1–33, 2000.

Christopher J Anderson. The end of economic voting? contingency dilemmas and the limits of democratic accountability. *Annu. Rev. Polit. Sci.*, 10:271–296, 2007.

Marco Battaglini and Stephen Coate. Inefficiency in legislative policymaking: a dynamic analysis. *American Economic Review*, 97(1):118–149, 2007.

Marco Battaglini and Stephen Coate. A dynamic theory of public spending, taxation, and debt. *American Economic Review*, 98(1):201–36, 2008.

Javier Bianchi. Efficient bailouts? Technical report, National Bureau of Economic Research, 2012.

Laurent Bouton, Alessandro Lizzeri, and Nicola Persico. The political economy of debt and entitlements. *The Review of Economic Studies*, 2016.

VV Chari and Patrick J Kehoe. Bailouts, time inconsistency, and optimal regulation: A macroeconomic view. *The American Economic Review*, 106(9):2458–2493, 2016.

Peter J Coughlin. *Probabilistic voting theory*. Cambridge University Press, 1992.

Cesi Cruz, Philip Keefer, and Julien Labonne. Incumbent advantage, voter information and vote buying. Technical report, IDB Working Paper Series, 2016.

Mathias Dewatripont and Jean Tirole. Liquidity regulation, bail-ins and bailouts. Technical report, Working Paper, 2018.

Avinash Dixit and John Londregan. The determinants of success of special interests in redistributive politics. *the Journal of Politics*, 58(4):1132–1155, 1996.

Allan Drazen. Towards a political-economic theory of domestic debt. In *The debt burden and its consequences for monetary policy*, pages 159–178. Springer, 1998.

Emmanuel Farhi and Jean Tirole. Collective moral hazard, maturity mismatch, and systemic bailouts. *The American Economic Review*, 102(1):60–93, 2012.

Xavier Freixas et al. *Optimal bail-out, conditionality and creative ambiguity*, volume 2238. Centre for Economic Policy Research, 1999.

Alessandro Gavazza and Alessandro Lizzeri. Transparency and economic policy. *The Review of Economic Studies*, 76(3):1023–1048, 2009.

Alexander Guembel and Oren Sussman. Sovereign debt without default penalties. *The Review of Economic Studies*, 76(4):1297–1320, 2009.

Allen Hicken, Stephen Leider, Nico Ravanilla, and Dean Yang. Temptation in vote-selling: Evidence from a field experiment in the philippines. *Journal of Development Economics*, 131:1–14, 2018.

Todd Keister. Bailouts and financial fragility. *The Review of Economic Studies*, 83 (2):704–736, 2015.

Todd Keister and Yuliyan Mitkov. Bailouts, bail-ins and banking crises. *Memo, presented at the Board of Governors of the Federal Reserve System, September*, 27, 2016.

Todd Keister and Vijay Narasiman. Expectations vs. fundamentals-driven bank runs: When should bailouts be permitted? *Review of Economic Dynamics*, 21: 89–104, 2016.

Jessica Leight, Dana Foarta, Rohini Pande, and Laura Ralston. Value for money? vote-buying and politician accountability. *Journal of Public Economics*, 190: 104227, 2020.

Assar Lindbeck and Jörgen W Weibull. Balanced-budget redistribution as the outcome of political competition. *Public choice*, 52(3):273–297, 1987.

Alessandro Lizzeri. Budget deficits and redistributive politics. *The Review of Economic Studies*, 66(4):909–928, 1999.

Ulrike Malmendier and Klaus M Schmidt. You owe me. *American Economic Review*, 107(2):493–526, 2017.

Eric Maskin and Jean Tirole. Pandering and pork-barrel politics. *Journal of Public Economics*, 176:79–93, 2019.

NY Times. Higgins, Andrew: Cyprus Bank's Bailout Hands Ownership to Russian Plutocrats. August 21 2013.

Torsten Persson and Lars EO Svensson. Why a stubborn conservative would run a deficit: Policy with time-inconsistent preferences. *The Quarterly Journal of Economics*, 104(2):325–345, 1989.

Torsten Persson and Guido Tabellini. *Political economics*. MIT press, 2016.

Linda Schilling. Too many voters to fail: Influencing and political bargaining for bailouts. Technical report, CEPR Discussion Papers, 2019.

Philip E Strahan. Too big to fail: Causes, consequences, and policy responses. *Annu. Rev. Financ. Econ.*, 5(1):43–61, 2013.

Guido Tabellini and Alberto Alesina. Voting on the budget deficit. *The American Economic Review*, 80(1):37, 1990.

Andres Velasco. Debts and deficits with fragmented fiscal policymaking. *Journal of Public Economics*, 76(1):105–125, 2000.

Pedro C Vicente. Is vote buying effective? evidence from a field experiment in west africa. *The Economic Journal*, 124(574):F356–F387, 2014.