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**Immigration from a terror-prone nation: destination nation's optimal immigration and counterterrorism policies**

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**Abstract**

The paper presents a two-country model in which a destination country chooses its immigration quota and proactive counterterrorism actions in response to immigration from a terror-plagued source country. After the destination country fixes its two policies, immigrants decide between supplying labor or conducting terrorist attacks, which helps determine equilibrium labor supply and wages. The analysis accounts for the marginal disutility of lost rights/freedoms stemming from stricter counterterror measures as well the inherent radicalization of migrants. Comparative statics involve changes to those two parameters. For example, an enhanced importance attached to lost rights is shown to limit immigration quotas and counterterrorism actions. In contrast, increased source-country radicalization reduces immigration quotas but has an ambiguous effect on optimal proactive measures. Extensions involving defensive policies and destination-country citizens radicalization are considered.

**JEL codes:** H56, F22, H87

**Keywords:** Immigration from a terror-prone country; Interplay between immigration quotas and proactive counterterrorism; Rights/freedoms; Source-country radicalization; Labor market equilibrium

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The views expressed are those of the authors and do not necessarily represent the official positions of the Federal Reserve Bank of St. Louis or the Federal Reserve System

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**Immigration from a terror-prone nation: destination nation's optimal immigration and counterterrorism policies**

## 1. Introduction

Since the four skyjackings on September 11, 2001 (henceforth, 9/11) by 19 foreign al-Qaida terrorists, the United States and other countries have instituted greater immigration restrictions. For example, former US President Donald Trump signed Executive Order 13769 on January 27, 2017, which ended temporarily immigration from seven Muslim-majority countries as a means to respond to an alleged link between immigration and terrorism (American Civil Liberties Union 2021). Other countries' populist candidates and leaders – e.g., Marine Le Pen in France, Beata Szydło in Poland, Russian President Vladimir Putin, and Hungarian Prime Minster Victor Orbán – pushed anti-immigrant policies as a counterterrorism tool to gain popular support (Choi 2018, 2021). Based on Eurobarometer data from 2003–2017, Böhmelt, Bove, and Nussio (2020) show that immigrant-tied terrorist attacks in Europe raised terrorism angst among respondents in venue countries, hosting the attack, and throughout Europe. Public opinion was more adverse to immigrants from *nearer* terror-ridden countries. The authors apply spatial econometric estimations to establish the importance of terror-source countries' propinquity in stoking the public's immigration fear.

In an earlier spatial-based study, Bove and Böhmelt (2016) find that migrants from *terror-prone* countries were a vehicle for bringing terror attacks to the immigrants' destination country. However, these authors also show that migration per se is not associated with more terrorist attacks,[1] thereby highlighting the importance of the presence of terrorism in the immigrants' source country as a vector for transferring terrorism abroad. In a somewhat related study, Dreher, Gassebner, and Schaudt (2020) indicate that there is a heightened terrorism risk to

[1] Based on bilateral migration data for 170 countries during 1990–2015, Forrester et al. (2019) uncover no relationship between general immigration and terrorist attacks in destination countries. Their study employs a clever instrument for terrorism, based on prior decades' stocks of immigrants to the destination countries.

a destination nation from migrants from terror-prone countries. When, however, the scale effect of population is taken into account, the transnational terrorism risk from migrants is no different than the domestic terrorism risk from citizens.[2]

In an overview article, Helbling and Meierrieks (2022) indicate that there is scant evidence that general migration necessarily results in more terrorism, particularly in Western nations.[3] Moreover, they link terrorism with negative public opinions that have electoral and political consequences, which can result in stricter immigration quotas. Based on past empirical studies, Helbling and Meierrieks (2022) characterize more stringent migration policies as having limited effects, if any, on terrorist attacks in countries adopting such restrictions. In an earlier article, Helbling and Meierrieks (2020) provide empirical evidence that transnational terrorist attacks resulted in stricter migration policies in 30 OECD countries during 1980–2010 as a means for increasing the cost of such attacks to potential immigrant terrorists. Choi (2021) finds that the number of terrorist attacks was, however, unrelated to the institution of more restrictive immigration policies in selected destination nations, attractive to low-skilled workers seeking higher wages. Although popular with the constituency, restrictive immigration quotas are not necessarily an effective tool for decreasing terrorism unless aimed at *terror-prone* source countries (Bove and Böhmelt 2016; Dreher, Gassebner, and Schaudt 2020).

The purpose of the current paper is to present a two-country investigation where a destination nation must choose its immigration quota and proactive countermeasures.[4] The

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[2] For transnational terrorist attacks, the victims, perpetrators, or the venue involve two or more nations; for domestic terrorist attacks, victims and perpetrators are citizens of the venue nation (Enders, Sandler, and Gaibulloev 2011; Gaibulloev and Sandler 2019; Schneider, Brück, and Meierrieks 2015).

[3] There is a related, but different, literature that analyzes whether refugees from conflict-torn countries can increase transnational terrorism in refugee-receiving states. Milton, Spencer, and Findley (2013) show that there is a positive relationship between refugee inflows and transnational terrorism in destination states. However, refugees differ from general immigrants. Also, see Buhaug and Gleditsch (2008) who find that transnational ethnic ties can promote the spread of neighboring conflicts through refugee flows.

[4] The model here differs greatly from Bandyopadhyay and Sandler (2014), which focuses on terror attacks at home and abroad directed in the source country through the terrorist group's draw of unskilled and skilled laborers. As a consequence, an important policy in the destination country is the choice between unskilled and skilled immigration

countermeasures are necessary as the destination nation receives immigrants from a terror-prone source country in which a proportion of its population is radicalized. An important innovation here is to account for the critical interdependence between those two policy choices in the destination country. After the destination government chooses its two policies in the first stage, immigrants from the source country must decide in the second stage between supplying labor or engaging in terrorist activities in light of the destination country's policy mix. An increase in the immigration quota augments the destination country's labor supply, thereby lowering wages, while enhanced proactive measures limit terrorists' success and encourage labor supply. Thus, both policies affect the labor market, thereby influencing the market-clearing labor wage and terrorism. A novelty of the current analysis is to introduce a utility cost of proactive counterterror measures, where the citizenry cares about their rights/freedoms which are compromised by heavy-handed government countermeasures.[5] We, thus, account for a proactive measure's tradeoff between reducing terror supply and compromising freedoms of the destination nation's citizens. We show that a destination nation that puts more value on such freedoms tend to institute smaller immigration quotas to limit the need for greater proactive measures with their concomitant loss of freedom. Thus, Western democracies where citizens demand greater rights and freedoms are anticipated to institute smaller immigration quotas and smaller proactive measures depending on the elasticity of labor demand and a uniform radicalization distribution. A second novel parameter of our analysis is the extent of citizen radicalization in the source country, which directly affects the share of immigrants that poses a terrorism risk abroad. Increased radicalization in the source nation tends to reduce the

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quotas, which is not the case in the current paper. Unlike the earlier paper, the current paper investigates how immigrants in the destination country create terrorism there after immigrating. Other differences between the two papers involve the mix of defensive and proactive policies in the destination and source countries.

[5] The rights/freedoms cost introduced here is different from proactive backlash, which can anger allied terrorist groups, sponsors, or sympathetic individuals and swell the ranks of the terrorist group (Arce and Sandler 2010; Bloom 2005; Rosendorff and Sandler 2004). Introducing backlash along with freedoms cost would add another cost of proactive measures that can be easily incorporated in the analysis resulting in even smaller immigration quotas.

immigration quota but may lower or raise optimal proaction response depending on key parameters.

The remainder of the paper contains four additional sections. In section 2, the two-stage model is developed to characterize the optimal immigration quota and the proactive campaign, while accounting for the interdependence of the two policies with the immigrant labor-terrorism choice. Section 3 contains the comparative statics involving changes in the radicalization parameter and the freedoms cost consequences. Some empirical evidence is provided in support of Proposition 1 where a greater marginal disutility of lost freedoms (associated with enhanced democracy) leads to stricter immigration quotas to limit the use of freedom-limiting proactive counterterrorism measures. Additionally, empirical support of Proposition 2 is also displayed, where enhanced source-country terrorism leads to smaller immigration quotas in the destination countries. In Section 4, we present extensions to the basic model involving defensive countermeasures or destination-country radicalization, followed in Section 5 with concluding remarks.

## 2. The Model

Our baseline model posits two nations: the immigrants' source nation and their destination nation. Since the latter hosts the immigrants, we label that nation with an *H* for host. Our focus is on *H*'s optimal immigration and counterterrorism policies where immigrants confer economic benefits from their productive contribution to *H*, while posing a terrorism risk from their inherent radicalization. We discuss the source nation, *S*, only as far as necessary to analyze *H*'s policy choices. If *S* is permissive, as is likely, in allowing its interested citizens to emigrate to *H*, *H*'s policy calculus is independent of what happens in *S* arising from *H*'s immigration quota.

Nation *H* has superior production technology and offers a higher wage, *w*, to immigrants relative to earnings in *S*. *H*'s firms competitively produce a single numéraire good, *Q*, with labor, *L*, and capital, *K*, abiding by a constant-returns-to-scale technology

$$Q = F(L, K), \tag{1}$$

with strictly positive marginal products of labor and capital ( $F_L > 0$ and $F_K > 0$, respectively) that display strictly diminishing returns so that $F_{LL} < 0$ and $F_{KK} < 0$. Nation *H* contains population *N*, where each native possesses a unit of labor and owns $\bar{k}$ units of capital, implying an aggregate capital endowment of $\bar{K} = N\bar{k}$ and a native labor force of *N*. Immigration allows *H* to augment its labor force through an immigration quota *I* for which $L = N + I^P$, where $I^P$ denotes immigrant-supplied labor. For simplicity, we assume that immigrants do not own any capital.

Because immigrants can come from a source country with an indigenous terrorist group, immigrant labor presents a potential terrorist risk. For example, US immigrants have come from Saudi Arabia, Afghanistan, Egypt, Lebanon, Iraq, Yemen, and other countries with one or more resident terrorist groups. In fact, 15 of the 19 al-Qaida hijackers on 9/11 came from Saudi Arabia. In our model, nation *S* is terror-prone with a fraction $\gamma\,(0 < \gamma < 1)$ of its population radicalized or sympathetic to the goals of resident terrorists.[6] Thus, immigration from *S* to *H* provides the potential for some radicalized immigrants to create terror in *H*. If nation *H* is to reap the economic benefits of a productive immigrant labor force in terms of greater output and lower wages, it must consider its immigration and counterterrorism policies.

Nation *H* sets a quota of *I* for immigration, thereby fixing the expected number of radicalized immigrants, $\gamma I$, given the inherent radicalization proportion $\gamma$ in the source nation.

[6] For expositional clarity and to highlight the interrelationships between immigration and terrorism, we initially assume that there is no radicalization of *H*'s natives. When allowing in Section 4 for radicalization in both nations, we investigate how such host-country radicalization affects our central findings by making immigration less desirable for the destination country.

Each immigrant *i* possesses a unit of labor. A non-radicalized immigrant supplies labor to the production of good *Q* for a wage *w*. In contrast, a radicalized immigrant must choose between working in the productive sector *Q* for *w* or to get a payoff $\theta^i$ from devoting that unit of labor to terrorism. Radicalization is heterogeneous with $\theta^i$ distributed among the immigrant population with a probability density function $g(\theta)$ with support $\left[\theta^0, \overline{\theta}\right]$, $\overline{\theta} > \theta^0 > 0$, and corresponding cumulative density function, $G(\theta)$.

Host nation *H*'s government must first decide how many immigrants to admit by granting work visas and also instituting counterterrorism safeguards to control potential immigrant-driven terrorism. Accordingly, we assume the following sequence of actions. In stage 1, *H*'s government chooses an immigration quota $I$ and a proactive counterterror effort level *E*. Proactive countermeasures confront terrorists and their resources directly (Enders and Sandler 2012; Schneider, Brück, and Meierrieks 2015).[7] A central concern here is how aggressive counterterrorism actions may cause native discontent through lost rights, which may, in turn, affect the destination country's policy agenda. In stage 2, atomistic immigrants in their destination nation choose either to join the productive sector or to volunteer their effort to terrorism, where the aggregate effort of terrorist volunteers determines the level of terrorism in *H*. The labor market-clearing condition indicates the equilibrium wage rate *w*, which then fixes *H*'s equilibrium levels of good *Q* and terrorism in stage 2, based on stage 1 policy choices. Thus, the host country's government chooses its optimal immigration quota and proactive response while being mindful of the competitive labor market equilibrium, which determines the wage as a function of the policy choices. Those choices can be viewed through the lens of a two-

[7] Section 4.1 extends our basic model to include defensive counterterror measures, which serve to protect potential targets and are less intrusive. Such actions include airport metal detectors or barriers in front of buildings and present minor freedom restrictions compared to proactive measures that can involve aggressive monitoring of citizen or immigrant residents.

stage process, where atomistic private agents move in stage 2 and the government anticipates their stage-2 equilibrium in its policy choices in stage 1.

Nation *H*'s proactive counterterror effort can take various forms such as covert operations to infiltrate terror networks to capture potential terrorists or to institute strict surveillance to monitor immigrants (Enders and Jindapon 2010; Gaibulloev and Sandler 2019; Schneider, Brück, and Meierrieks 2015). Aggressive proactive measures can restrict some freedoms of movement or association as strict laws are enacted such as the USA Patriot Act following 9/11, which greatly expanded the powers of the authorities to address terrorism, including the expanded use of wire taps (Enders and Sandler 2012). At proactive effort level *E*, $\alpha(E)$ fraction of potential terrorists is assumed to be detected in which these individuals lose their labor endowment. Additionally, we assume that a greater fraction of potential terrorists is caught with more counterterror effort although at a diminishing rate, such that $\alpha'(E) > 0$ and $\alpha''(E) < 0$. For expositional simplicity, we define $\beta(E) \equiv 1 - \alpha(E)$ as the fraction of potential terrorists not detected, where $\beta'(E) = -\alpha'(E) < 0$ and $\beta''(E) = -\alpha''(E) > 0$.

## 2. 1. *Stage 2: Immigrants' optimizing choice between working and terrorism*

Since *E* is chosen by *H*'s government in stage 1, a radicalized immigrant, who acts in stage 2, knows that the probability with which the individual can successfully perpetrate terrorist acts without being caught is $\beta(E)$; thus, the expected payoff of an immigrant from joining the terror organization is $\beta(E)\theta^i$. In contrast, the immigrant can obtain a certain payoff of *w* by joining the productive sector. A risk-neutral radicalized immigrant joins the productive sector if $\beta\theta^i < w$, which implies that $\theta^i < w/\beta(E)$. Based on the aforementioned cumulative density function, the fraction of radicalized immigrants who join the productive sector is $G\left[w/\beta(E)\right]$. Given that the expected number of radicalized immigrants is $\gamma I$, the total number of immigrants who join the terror organization consists of $\left\{1-G\left[w/\beta(E)\right]\right\}\gamma I$; but, only a $\beta$ fraction of this pool can successfully supply terror effort, with the rest being arrested. Using these facts, denoting the aggregate terror effort by $L^T$, and assuming a linear terror production function, we have that immigration-induced terror equals

$$T = L^T = \beta(E)\left\{1-G\left[w/\beta(E)\right]\right\}\gamma I. \tag{2}$$

Turning to the labor supplied to the productive sector, recall that $1-\gamma$ fraction of the immigrants is nonradicalized and a fraction $G\left[w/\beta(E)\right]$ of the radicalized immigrants (totaling $\gamma I$) choose to join the productive sector. Thus, immigrant-supplied productive labor equals

$$I^P = (1-\gamma)I + G\left[w/\beta(E)\right]\gamma I = \psi(w,E)I, \tag{3a}$$

where $0<\psi(w,E)\equiv 1-\gamma+\gamma G\left[w/\beta(E)\right]<1$ is the fraction of the total immigration pool contributing its productive labor. Since *g* denotes the probability density function of immigrant radicalization, we get

$$\psi_w(w,E)=\frac{\gamma g}{\beta}>0 \text{ and } \psi_E(w,E)=-\frac{\gamma w g \beta'}{\beta^2}>0. \tag{3b}$$

The cost function for counterterrorism effort, $c(E)$, is assumed to be increasing and convex in *E*, such that $c'(E)>0$ and $c''(E)>0$. There is an assimilation cost of hosting immigrants, $A(I)$, which is increasing and convex in *I*, such that $A'(I)>0$ and $A''(I)>0$. Given Eq. (1) and its associated discussion, we have that *H*'s national income, *Y*, net of payments to immigrant labor, counterterror expenses, and assimilation costs equals[8]

$$Y = F\left(N + I^P, \bar{K}\right) - wI^P - c\left(E\right) - A\left(I\right). \tag{4}$$

We next consider the welfare of *H*'s citizens who gain productive activities but must confront terrorist risks and possible affronts to their civil and political rights from proactive counterterrorism actions. For tractability, *H*'s citizens are assumed to have constant marginal utility from consumption and constant marginal disutility from terror. In addition, they care about their rights, denoted by *R*, which stand for societal norms related to rights to privacy, freedom of speech, rights to associate, and other civil and political freedoms. Taking all these aspects into consideration and also assuming a constant and unit marginal utility from rights, we can express the host-nation government's utility or welfare function as

$$U = Y - T + R. \tag{5}$$

We assume that citizens are endowed with rights $\bar{R}$, defined by *H*'s history or institutions; however, these rights are curbed by proactive counterterror measures in pursuit of radicalized individuals.[9] We assume that rights are reduced by proactive effort at a constant rate $\rho$, so that

$$R = \bar{R} - \rho E. \tag{6}$$

Using Eq. (2) and Eqs. (4)-(6), we can express host government's objective function as

$$U = F\left(N + I^P, \bar{K}\right) - wI^P - c\left(E\right) - A\left(I\right) - \beta\left(1 - G\right)\gamma I + \bar{R} - \rho E. \tag{7}$$

Next, we consider the labor market-clearing condition which determines the equilibrium level of wages, *w*. The demand for labor, $L^d$, is implicitly defined by the competitive profit-

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[8] Although the context is quite different, the income consequences of immigration policy are related to issues explored in Bond and Chen (1987), Ethier (1986), and others with respect to illegal immigration in terms of enforcement cost or the social consequences of immigration.

[9] While we abstract in this section from considering terrorism by *H*'s citizens, they cannot be immune to changes in society's rules and regulations enacted to counter terrorism. The enactment of the post-9/11 USA Patriot Act is a stark reminder of this loss of freedoms. In many nations, such changes can result in explicit or implicit censorship of the media so that they do not publish/broadcast messages that may lead to social unrest or conflict between communities. Rules to privacy may be encroached upon when a citizen is asked to prove their citizenship status or provide other identifying information to facilitate proactive monitoring.

maximization condition of firms that equates $w$ to the marginal product of labor $F_L$ : namely,

$$w = F_L\left(L, \bar{K}\right) \Rightarrow L^d = L^d\left(w\right),\ L^{d\prime}\left(w\right) = \frac{1}{F_{LL}} < 0. \tag{8}$$

Given Eq. (3a) defining immigrant-supplied labor, the supply of labor, $L^S$, inclusive of the productive immigrant labor force, is

$$L^S = N + I^P = N + \psi\left(w, E\right)I = L^S\left(w, I, E\right). \tag{9}$$

Using Eqs. (8) and (9) and reorganizing terms, we get the labor market-clearing condition $\left(L^d = L^S\right)$ to be

$$L^d\left(w\right) - N - \psi\left(w, E\right)I = 0, \tag{10a}$$

which implicitly defines the equilibrium wage:

$$w = w\left(I, E\right) \text{ with } w_I = \frac{\psi F_{LL}}{1 - I\psi_w F_{LL}} < 0, \text{ and } w_E = \frac{I\psi_E F_{LL}}{1 - I\psi_w F_{LL}} < 0. \tag{10b}$$

The signs of the partial derivatives of the wage function follow because $L^{d\prime}\left(w\right) = 1/F_{LL}$, $\psi_w > 0$, and $\psi_E > 0$, with the latter two partials positive from Eq. (3b).

The wage effects of changes in the immigration quota $I$ and counterterror effort $E$, described in Eq. (10b), are best understood in terms of a familiar labor-market equilibrium graph (not drawn). Assume that the wage rate is measured on the vertical axis, while labor demand and supply amounts are measured on the horizontal axis. At a given counterterror level $E$, a rise in the immigration quota $I$ shifts the labor supply function, $L^S\left(w, I, E\right) \equiv N + \psi\left(w, E\right)I$, to the right, without affecting the labor demand function $L^d\left(w\right)$. As a consequence, the equilibrium wage rate must fall with the higher the immigration quota. Similarly, at a given $I$, an increase in counterterror effort $E$ boosts the share of productive immigrants $\psi$ and shifts the labor supply function to the right, lowering the equilibrium wage rate.

Next, we consider destination nation *H*'s immigration and counterterrorism decisions in stage 1, while taking stage-2 equilibrium outcomes in terms of wages and immigrant-supplied terrorism into consideration.

2.2. *Stage 1: Destination government's optimal immigration quota and proactive counterterrorism policies*

Substituting Eq. (10b) into Eq. (7), we get

$$U = F\left(N + I^P, \bar{K}\right) - w(I,E)I^P - c(E) - A(I) - \beta(E)\left\{1 - G\left[w(\bullet)/\beta(E)\right]\right\}\gamma I + \bar{R} - \rho E. \quad (11)$$

Differentiating Eq. (11), noting that $w = F_L$, and also applying Eqs. (3a) and (10b), the first-order conditions (FOCs) for maximizing *U* through appropriate choices of the immigration quota *I* and the counterterror policy level *E* are, respectively,[10]

$$U_I = (\gamma g - \psi) I w_I - A' - \gamma\beta(1 - G) = 0, \quad (12a)$$

and

$$U_E = (\gamma g - \psi) I w_E - \gamma\beta'\left(1 - G + \frac{wg}{\beta}\right) I - c' - \rho = 0. \quad (12b)$$

To understand the tradeoffs underlying the optimal policy choices in Eqs. (12a) and (12b), we commence with the traditional frame of reference, where there is no terrorism and, thus, no relevant counterterror policy so that Eq. (12b) is dropped. The no-terrorism immigration choice is nested in our model in Eq. (12a) for the case where there is no radicalization in the source nation, such that $\gamma = 0$ and $\psi = 1$. In this case, Eq. (12a) simply yields $-Iw_I = A'$.

[10] Details of the derivation are in the Appendix. We assume sufficient convexity in the assimilation and enforcement cost functions to ensure that the second-order conditions are satisfied. To focus on novel policy tradeoffs novel, we further assume that the underlying functional forms and parameters generate interior solutions. The associated boundary conditions require that (a) the marginal benefit of *I* and *E* exceed their respective marginal costs at $I = 0$ and $E = 0$, respectively; and (b) the marginal benefit for each policy variable is less than their marginal cost at some feasible policy levels, given the underlying parameterizations and functional forms.

Because an increase in the immigration quota reduces the wage rate (i.e., $w_I < 0$), the return to capital rises. The immigrants, who have no capital, sustain a net aggregate loss of $Iw_I$, which constitutes a net transfer to capital, held by the natives. In effect, raising the immigration quota confers a net marginal benefit to the natives of $-Iw_I$.[11] At the optimum immigration quota in the no-terrorism case, the marginal benefit of immigration is equated to the marginal assimilation cost of $A'$.

In the first term on the right-hand side of Eq. (12a), the traditional wage-reduction benefit $-Iw_I < 0$ is muted by $0 < \psi - \gamma g < 1$,[12] because of two factors. First, the wage-reduction benefit only applies to the productive fraction $\psi$ of the immigrants' work force and not to the entire immigrant pool. Second, the wage reduction motivates some immigrants to supply terror, as captured by $\gamma g$. The second term on the right-hand side of Eq. (12a) measures the assimilation marginal cost. Finally, the last term in Eq. (12a) measures, *ceteris paribus*, increased terror in the proportion $\gamma\beta(1-G)$ from any increase in immigration [see Eq. (2)]. In the final analysis, the optimal immigration quota balances the scaled-down wage-reduction benefit $(\gamma g - \psi)Iw_I$ to natives with the marginal costs of assimilation and terror augmentation.

We now turn to Eq. (12b) to indicate how country *H* optimally chooses proactive measures *E*. Given Eq. (10b), we know that an increase in *E* reduces the wage rate at a given immigration level. As in the case of the immigration quota, this wage reduction confers a marginal benefit of $(\gamma g - \psi)Iw_E$. There is, however, an additional terror-reduction benefit of $-\gamma\beta' I\left[1 - G + (wg/\beta)\right]$. The latter term captures the dual benefits of (a) an increase in the

[11] We should note that the natives also lose on their own wage earnings, but that loss is more than offset by their gains in capital earnings.

[12] Recall that $0 < \psi < 1$ and that Eq. (12a) implies $\psi - \gamma g = -\left[A' + \gamma\beta(1-G)\right]/Iw_I > 0$.

fraction of terrorist volunteers who are caught and (b) an increase in immigrants who choose to join the productive labor force. The latter stems from the higher *ex ante* probability of detection from more stringent proactive measures. At an optimum, the chosen counterterror effort must balance the previously mentioned marginal benefits with the sum of the proaction provision's marginal cost $c'$ and the marginal disutility cost of lost rights, $\rho$.

## 3. Comparative Statics

### 3.1. *Effect of an increase in citizens' marginal disutility from proactive measures*

Next, we investigate how an increase in $\rho$ affects the optimal policy combination of $E$ and $I$. Intuitively, one anticipates that a larger citizens' marginal disutility from proactive efforts, as inherent rights are trampled, would moderate the optimal proactive measure. However, the effect of $\rho$ on optimal immigration choice is less clear owing to consequences stemming from the labor market as immigrants' labor-terrorism choice is impacted. To investigate the impact of lost rights on $H$'s optimal policy mix, we analyze the optimal policy rules in Eqs. (12a) and (12b) to obtain Proposition 1 below.

*Proposition 1*

A rise in citizens' marginal disutility from proactive counterterror measures (a) reduces optimal proactive effort and (b) reduces the optimal immigration quota if the labor demand function is linear with an elasticity (at equilibrium) exceeding the proportion of immigrants in the total labor force, and if the payoffs of radicalized individuals are uniformly distributed.

*Proof:*

All proofs of the propositions are in the Appendix at the end.

We first discuss the intuition behind Proposition 1's comparative-static results, followed by the sufficiency conditions and policy implications. Greater lost rights, captured by a larger $\rho$, amplify the marginal cost arising from proactive counterterrorism measures, thus lowering optimal *E*. Under a uninform distribution $g(\theta)$ of radicalization payoffs, we find that three effects determine the relationship between optimal *E* and *I*. The first two unambiguously suggest complementarity between *E* and *I*, while the third suggests complementarity under the sufficiency condition outlined in part (b) of Proposition 1.

First, greater counterterror effort limits terrorism and thus reduces the marginal terror-related cost of immigration – see the discussion following Eq. (12a) about the direct effect of immigration on terror. Second, at a larger proactive level, more immigrants join the labor force, enhancing the wage-reducing benefits accruing to nation *H*'s capital. Finally, a rise in proactive measures affects the magnitude of the wage-reducing effect of immigration, $|w_I|$. In the Appendix, we show that if labor demand is sufficiently elastic at the optimum immigration level, then $|w_I|$ rises when *E* rises, amplifying the marginal wage-related benefit of the immigration quota.[13] In the latter case, the three effects align to indicate a complementary relationship between optimal *E* and optimal *I*. Accordingly, optimal proaction and optimal immigration quota fall as a response to a rise in $\rho$. More democratic countries place a greater disutility $\rho$ on lost freedoms or rights which, given Proposition 1, should negatively correlate with immigration flows, thereby indicating smaller immigration quotas, which we explore empirically at the end of this subsection for a 28-country sample.

[13]A larger *E* raises the fraction of immigrants $\psi$ who join the labor force. Noting from Eq. (9) that $dL^S|_{\psi} = \psi dI$, we find that an increase in immigration translates to a greater shift of the labor supply curve at a higher $\psi$. In turn, we have a sharper fall in the wage rate along the downward-sloping demand curve (i.e., a larger $|w_I|$). However, the slope of the labor supply curve also changes as *E* rises. Therefore, we need to impose some sufficiency conditions (see Appendix) to ensure that the shift effect dominates any potential offsetting effects from the slope change.

A uniform distribution of radicalization payoff considerably simplifies the analysis; otherwise, marginal changes can be sharply amplified or diminished by the rate at which the probability density changes at the cutoff level of occupational choice, $\theta = w/\beta$. A smooth distribution of beliefs also fosters the signing of the comparative statics by allowing for smooth changes of beliefs among a large number of individuals in the source country. In terms of the labor demand elasticity condition, we note that a second-order approximation of the production technology, $F_{LLL} = 0$, provides tractability. Moreover, the constancy of $F_{LL}$ implies a linear labor demand curve via Eq. (8). We note that the labor elasticity, $\varepsilon = -w/\left[L^d(w)F_{LL}\right]$, must rise with *w* because $F_{LL}$ is constant and $L^d$ falls as *w* rises. A large equilibrium *w* associated with a high labor demand elasticity is more likely to occur when optimal immigration (and hence equilibrium labor supply) is relatively low because of assimilation or terror cost considerations. Finally, since the ratio of immigrants in the labor force $I^P/(N + I^P)$ must be less than unity, the sufficiency condition is met by any unit-elastic or elastic linear labor demand function.

In the immediate aftermath of 9/11, the US responded with fairly aggressive counterterrorism policies, including the USA Patriot Act, which, among other things, mandated greater surveillance of suspected terrorists, limited privacy of individuals, reduced rights for an accused individual, extended anti-money laundering activities, augmented border protection, and enhanced interagency cooperation (Enders and Sandler 2012, 319–22). The USA Patriot Act was the precursor to the Department of Homeland Security (DHS). Over time, often due to public resistance (related to the parameter $\rho$), some of the USA Patriot Act's policies that expanded surveillance and wiretapping have been partially rolled back. Along the lines of the complementarity highlighted in Proposition 1, such rollbacks may have led to more caution on the immigration front, as starkly evidenced by the Trump administration's controversial efforts in 2017 to restrict immigration from seven Muslim-majority nations with Executive Order 13769. After many court rulings, the US Supreme Court allowed a revised, somewhat softened, ban under Executive Order 13780 until revoked by President Biden on January 20, 2021, after assuming office (American Civil Liberties Union 2021). While the use of such immigration measures remains problematic for several reasons, US policy actions and experience since 9/11 indicate that terror-related concerns certainly dampened the enthusiasm of a host nation to benefit from a potentially productive immigrant labor force.

Immigration policy data from 28 countries drawn from Asia, the Middle East, Europe, and North and South American (as listed in Table A1 in online Appendix) are obtained from Peters (2015) and Shin (2017, 2019). The overall immigration policy score ranges between –2.5 and 2.5 with a larger value signifying a more open immigration policy. We also examine three components of the immigration policy: nationality, quota, and immigrant rights. The nationality variable assesses whether a country's immigration law targets particular nationalities and excludes based on national origin. Quota reflects the existence and restrictiveness of the quota. The immigrant rights variable considers immigrant legal rights, anti-discriminatory and integration policies, path to permanent residency, and access to the social welfare system. Each component variable takes a value from 1 to 5 with a higher score implying that the state is more open to immigrants.[14]

Data on democracy variables come from two sources. Information on electoral democracy, liberal democracy, and participatory democracy is derived from Varieties of democracy (V-Dem) project (Coppedge et al. 2023), while data on Polity 2 are acquired from Marshall and Gurr (2014). Electoral democracy index measures a country's achievement in

[14] Other elements of overall immigration policy are skill level restrictions, citizenship criteria, refugee policy, asylum policy, family reunification policy, immigrant recruitment policy, restrictions on labor market participation, deportation policy, and enforcement policy. The results for these variables are available upon request.

terms of free and fair elections, electoral competition, political and civil society participation, freedom of expression, and independent media. Liberal democracy index reflects a country's standing when it comes to protection of civil liberties, rule of law, independent judiciary, and checks and balances. Participatory democracy index underscores the importance of active citizens' participation in all political process, electoral and non-electoral. Each index ranges between 0 and 1, with a higher value indicating a greater level of democracy. Finally, the Polity 2 variable is a measure of overall democracy that varies between –10 (strong autocracy) and +10 (strong democracy).

[Table 1 here]

Table 1 shows the correlation between immigration policy and democracy variables for the entire sample period, 1970-2013, and three subperiods: 1970–1989, 1990–2000, and 2001–2013. There is a negative correlation between democracy and overall immigration policy; more democratic states have a less open immigration policy, which holds across all reported measures of democracy and subperiods. An analysis of the components of the immigration policy shows that as the degree of democracy increases (consistent with a larger $\rho$), the state's nationality and quota policies become more restrictive. However, democracies offer more legal rights to immigrants than less democratic nations.[15] The correlations are stronger after 1990: e.g., the correlation between quota and electoral democracy is around –7% before 1990 but around –30% after 1990. This suggests that democracies' immigration policies become more stringent over time, particularly when it comes to nationality and quota restrictions. The rise of religious fundamentalist terrorism in 1990 and beyond corresponds to a heightened terrorism threat to Western democracies, making more restrictive immigration policies understandable (Gaibulloev and Sandler 2019).

[15] Democracies are more restrictive in terms of skills requirements, and recruitment and enforcement policies but more open in terms of other policies that place more emphasis on immigrants' rights (available upon request).

Next, we divide the sample into democracies with the Polity 2 score of 6 and above and non-democracies with the Polity 2 score of less than 6,[16] and compute the average value of immigration policy for each group. Similar to Table 1, Table 2 reports results for the entire sample period and three subperiods. Neither democracies nor non-democracies have a very open immigration policy; but democracies are substantially more restrictive, and the difference is statistically significant based on the p-value. The results also confirm that democracies implemented more restrictive immigration policies after 1990. Our correlation analysis supports Proposition 1 by indicating that democracies which value freedoms, and hence place a higher disutility on losses to these freedoms, institute more restrictive immigration quotas, thereby curtailing the need for proactive measures.

[Table 2 here]

### 3.2. *Effects of an increase in the proportion of a source country's radicalized population*

Some source nations may be known to be more terror-prone than others owing to a greater proportion of radicalized citizens. How does this affect a destination nation's immigration and counterterror policy choices? To address this question we investigate how a rise in the proportion of the radicalized population in *S* (i.e., $\gamma$) influences nation *H*'s optimal policy mix in Proposition 2:

*Proposition 2*

A sufficient, but not necessary, set of conditions for a rise in the proportion of the radicalized population, $\gamma$, to reduce the optimal immigration level is that payoffs of the radicalized are uniformly distributed, and that the own negative effect of $\gamma$ on immigration dominates a

[16] This division is consistent with the literature – see, e.g., Gaibulloev, Piazza, and Sandler 2017.

potentially opposing positive cross effect from a change in the proaction level. Optimal proaction may rise or fall.

Recall from the discussion of Eq. (12a) that $\gamma\beta(1-G)$ measures the terror-inducing effect of immigration. Naturally, an increase in $\gamma$ amplifies that effect by reducing net marginal benefit of immigration and also pulls down the size of the productive labor force. The latter scales down the wage benefits in the first term of Eq. (12a), thereby further limiting the marginal benefit of immigration. Finally, it can be shown that the magnitude of the wage benefit from immigration, i.e., $|w_I|$, falls as $\gamma$ increases. Those effects together constitute the negative "own effect" of $\gamma$ on the marginal benefit of immigration (at a given proactive level). There is, however, also a cross effect to consider from the change in the optimal proactive level. As long as the own effect dominates, a rise in $\gamma$ reduces the marginal benefit of immigration, thus *pulling down the optimal immigration quota*.

For greater proaction, the direct terror-reducing benefit in Eq. (12b) is captured by $-\gamma\beta' I\left[1-G+\left(wg/\beta\right)\right]$, where a larger $\gamma$ amplifies this benefit. In contrast, as mentioned in the earlier paragraph, the size of the productive labor force drops, which dampens the benefit from wage reduction shown in the first term of Eq. (12b). Finally, the magnitude of the wage benefit from enhanced enforcement, i.e., $|w_E|$, can be shown to increase as $\gamma$ increases. Only if the dampening effect on the first term in Eq. (12b) is relatively small compared to the other two effects, then "own effect" of $\gamma$ on the marginal benefit of enforcement is positive, tending to raise optimal proactive measures. However, the "own effect" could be negative, such that a fall in optimal proaction cannot be ruled out.

To test the hypothesized negative relationship between source country radicalization and immigration in Proposition 2,[17] we track the changes in immigration policies of 27 migrants' destination countries in response to terrorism in migrants' source countries for 1990–2010, where sample countries and time period are chosen based on the availability of data.[18]. The enhanced terrorist activities in a source country is used as a proxy for radicalization.

The overall immigration policy score and, its component, quota represent measures of a country's immigration policy. Terrorism in migrants' source countries is computed as follows. For each sample country-year, we identify the migrants' countries of origin. Next, we compute the number of terrorist attacks in each source country and aggregate them annually. Finally, we divide the total terrorist attacks in migrants' source countries (*TICO*) by the total terrorist attacks in the world (*TT*), thereby giving *TICO/TT* as our independent variable. For example, the migrants from 62 countries resided in New Zealand in 1990, where the ratio is the sum of terrorist attacks in these 62 countries (1731) divided by the total terrorist events in the world (3288), which equals 0.526. We also compute an alternative independent variable by counting (in numerator) terrorism of only the source countries whose nationals constitute at least 1% of total migrants in a destination country.

The information on the stock of migrants from various source countries to a sample country is obtained from United Nations Population Division (2020). The estimates on bilateral migration are provided at five-year intervals; thus, we use the migrant stock for a data-year for that year and the ensuing four years. For example, the migration matrix for 1990 is used to identify the list of source countries for 1990–1994. Data on terrorist attacks are extracted from

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[17] Since there is no data on proactive efforts or spending, we cannot test the validity of the Proposition 2's ambiguity with respect to proactive measures.

[18] The immigration policy dataset consists of 29 countries and ends in 2013. Hong Kong and Taiwan are excluded due to missing information for other variables. See Table A1 in online Appendix for the list of countries. Also, immigration policy data for 2011–2013 are missing for most sample countries and are dropped. Furthermore, data on international migrant stock start in 1990.

the National Consortium for the Study of Terrorism and Responses to Terrorism (START) (2020).

[Table 3 near here]

Table 3 presents the results of a simple regression of terrorism in migrants' source countries on immigration policy of their destination countries. The correlation is negative and statistically significant; thus, consistent with Proposition 2, increase in terrorism (radicalization) in the migrants' source countries is associated with less open immigration policy in destination countries. We also account for time-specific effects (Model 2) and the result holds.[19] In Models 3 and 4, we examine quota policy of destination countries and reach the same conclusion. An increase in terrorism in migrants' source countries leads to more restrictive quota policy in their destination countries. We repeat our analysis by restricting the source countries to those whose nationals constitute at least 1% of total migrants in a destination country (Models 5–8). The estimated relationship remains negative and statistically significant, but the size of the coefficients becomes larger suggesting that a destination country's immigration policy is more sensitive to terrorism in nations that are sources of a large share of migrants. The findings hold if we lag terrorism by a year (available upon request).

Proposition 2 is directly related to efforts by destination nations to scale back immigration from terror-prone source nations. Often, but not always, these immigration policies have been coupled with heightened proactive policies in the form of vetting/monitoring of immigrants. Such enhanced monitoring can be expected to soften the immigration-reducing effect discussed in Proposition 2 because of the possible complementarity of proaction and immigration, identified in Proposition 1.

[19] The immigration policy changes slowly over time, which does not allow us to include country fixed effects.

## 4. Extensions to the Model

### 4.1. *Defensive and proactive measures as counterterror policies*

The first extension considers the possibility of applying both defensive and proactive measures against terrorist attacks. Let *Z* denote the level of defensive measures used by the government to harden targets to limit terrorist success and damage from terror attacks. Such measures include armed guards, metal detectors, target surveillance, and cement barriers. In light of defensive action, immigration-induced terrorism now equals

$$T = \mu(Z)L^T = \mu(Z)\beta(E)\{1-G[w/\beta(E)]\}\gamma I, \tag{13}$$

where $0<\mu(Z)\leq 1$, $\mu(0)=1$, $\mu'(Z)<0$, and $\mu''(Z)>0$, such that defense curbs terror at a diminishing rate. We assume that the cost function for defensive effort possesses the same essential functional form as that for proactive effort, *E*, so that $c'(Z)>0$ and $c''(Z)>0$. With both defensive and proactive countermeasures, *H*'s national income, *Y*, net of payments to immigrant labor, counterterror expenses, and assimilation costs now equals

$$Y = F\left(N+I^P,\bar{K}\right)-wI^P-c(E)-c(Z)-A(I). \tag{14}$$

Substituting Eqs. (6), (13), and (14) into Eq. (5) and noting that Eqs. (8) through (10b) are unchanged, we get a revised version of *H*'s welfare as

$$\begin{aligned} U = {} & F\left(N+I^P,\bar{K}\right)-wI^P-c(E)-A(I) \\ & -\mu(Z)\beta(E)\{1-G[w/\beta(E)]\}\gamma I+\bar{R}-\rho E-c(Z). \end{aligned} \tag{15}$$

The FOCs corresponding to optimal choices of the immigration quota, the proactive level, and defense effort are, respectively,

$$U_I = (\mu\gamma g-\psi)Iw_I - A' - \mu\gamma\beta(1-G) = 0, \tag{16a}$$

$$U_E = (\mu\gamma g - \psi) I w_E - \mu\gamma\beta'\left(1 - G + \frac{wg}{\beta}\right) I - c'(E) - \rho = 0, \tag{16b}$$

$$U_z = \gamma\beta I (1-G) |\mu'(Z)| - c'(Z) = 0. \tag{16c}$$

In Eq. (16a), the terror-related marginal costs of immigration, previously discussed in the context of Eq. (12a), are diminished by a factor $\mu < 1$ due to defensive action. At a diminished marginal cost of terror, immigration becomes more attractive, suggesting a complementarity between the immigration quota and defensive effort. Turning to Eq. (16b), defense makes the first right-hand term smaller compared to the corresponding term in Eq. (12b), thus indicating a lower wage-related terror cost of proaction. However, the second right-hand term of Eq. (16b) indicates a smaller marginal benefit (from terror reduction) of proaction because of defense's protective effect. We can show that the second term dominates, establishing substitutability between defense and proaction – namely, better protected targets require fewer offensive actions to confront the terrorists directly. Finally, the two terms on the right-hand side of Eq. (16c) are defense's direct terror-reducing marginal benefit $\left[\gamma\beta I (1-G) |\mu'(Z)|\right]$ and its marginal cost $\left[c'(Z)\right]$, whose equality fixes the optimal defense level.

Given the patterns of complementarity between immigration and defense, and substitutability between proaction and defense, we address how the three policy variables respond to an increase in the marginal disutility of lost freedoms $\rho$ from enhanced proactive measures. Proposition 3 summarizes our findings.

*Proposition 3*

A rise in the marginal disutility $\rho$ of proactive counterterror measures reduces optimal proactive effort. If proaction and immigration are substitutes ($U_{IE} \leq 0$), then defense and immigration must both rise. Otherwise, the effects on immigration and defense are ambiguous, but defense must rise if immigration increases.

An increase in $\rho$ indicates an increase in the effective marginal cost of proactive effort $\left[i.e., c'(E)+\rho\right]$, which leads to a decrease in the optimal level of such effort. Effects of a change in $\rho$ on defense and immigration critically hinge on the pattern of substitutability/complementarity between immigration and proactive measures. We first consider the case of immigration-proaction substitutability $\left[i.e., U_{IE} \leq 0\right]$. Turning to the relationship between defense and proaction, we can show that $U_{EZ} < 0$, indicating that proaction and defense are substitutes. Thus, when proaction falls in response to a rise in $\rho$, both defense and immigration tend to rise because of their respective substitutability with proaction. In addition, we can show that defense and immigration are complements (i.e., $U_{IZ} > 0$), which then amplifies the joint increases in immigration and defense in response to reduced proaction.

Under complementarity between *I* and *E* $\left[\text{i.e.}, U_{IE} > 0\right]$, the fall in proaction tends to pull down optimal immigration (i.e., raise immigration quota), as previously discussed in the context of Proposition 1. However, in the presence of defense, there is an opposing or softening effect on immigration restrictions due to a substitution of defense for proaction and the fact that defense pulls immigration up given defense-immigration complementarity. Indeed, optimal immigration may in principle rise in response to an increase in $\rho$ if the defense-immigration complementarity effect dominates the proaction-immigration complementarity effect. If, moreover, optimal immigration rises in response to an increase in $\rho$, defense must surely rise because of both defense-proaction substitutability and defense-immigration complementarity.

The previously indicated empirical negative correlation between democracy and immigration flows suggests, however, that the ameliorating effect of jointly supplied defensive countermeasures *does not undo* the finding that enhanced democratic principles lead to smaller immigration quotas or greater immigration restrictions. This then suggests that defense-immigration complementarity does not dominate.

### 4.2. ***Domestic radicalization in the host nation of immigrants***

We now extend the model to allow for native and immigrant radicalization. Accordingly, a fraction $\tilde{\gamma}\left(0<\tilde{\gamma}<1\right)$ of *H*'s population *N* is radicalized. Moreover, the distribution of the payoff $\theta^i$ of radicalized natives is characterized by the probability density function $\tilde{g}\left(\theta\right)$ with support $\left[\tilde{\theta}^0, \tilde{\theta}^H\right]$, $\tilde{\theta}^H > \tilde{\theta}^0 > 0$, and by the corresponding cumulative density function, $\tilde{G}\left(\theta\right)$.

The terror choice decision for a radicalized native is similar to that for an immigrant, such that $\left\{1-\tilde{G}\left[w/\beta\left(E\right)\right]\right\}$ fraction of the $\tilde{\gamma}N$ radicalized natives join the terror group. The terror production function in Eq. (2) is, thus, amended to

$$T = L^T = \beta\left(E\right)\left\{\left[1-G\left(\cdot\right)\right]\gamma I + \left[1-\tilde{G}\left(\cdot\right)\right]\tilde{\gamma}N\right\}. \tag{17}$$

Base model Eqs. (3a) and (3b) are unchanged, but there are two additional corresponding equations characterizing the native productive labor force denoted by $N^P$,

$$N^P = \left(1-\tilde{\gamma}\right)N + \tilde{G}\left[w/\beta\left(E\right)\right]\tilde{\gamma}N = \tilde{\psi}\left(w,E\right)N, \tag{18a}$$

where $0<\tilde{\psi}\left(w,E\right)\equiv 1-\tilde{\gamma}+\tilde{\gamma}\tilde{G}\left[w/\beta\left(E\right)\right]<1$ is the fraction of natives who join the productive labor force, and where

$$\tilde{\psi}_w\left(w,E\right) = \frac{\tilde{\gamma}\tilde{g}}{\beta} > 0 \text{ and } \tilde{\psi}_E\left(w,E\right) = -\frac{\tilde{\gamma}\tilde{g}w\beta'}{\beta^2} > 0. \tag{18b}$$

With native radicalization, net national income equals

$$Y = F\left(N^P + I^P, \bar{K}\right) - wI^P - c\left(E\right) - A\left(I\right). \tag{19}$$

For labor market clearing, the labor demand function is unchanged from Section 2, but the labor supply function is now

$$L^S = N^P + I^P = \tilde{\psi}\left(w, E\right)N + \psi\left(w, E\right)I = L^S\left(w, I, E\right). \tag{20}$$

Corresponding to Eqs. (10a) and (10b), the labor market equilibrium conditions are obtained using Eqs. (8) and (20) as

$$L^d\left(w\right) - \tilde{\psi}\left(w, E\right)N - \psi\left(w, E\right)I = 0 \text{ and} \tag{21a}$$

$$w = w\left(I, E\right) \text{with } w_I = \frac{\psi F_{LL}}{1 - \left(N\tilde{\psi}_w + I\psi_w\right)F_{LL}} < 0 \text{ and } w_E = \frac{\left(N\tilde{\psi}_E + I\psi_E\right)F_{LL}}{1 - \left(N\tilde{\psi}_w + I\psi_w\right)F_{LL}} < 0. \tag{21b}$$

Applying Eqs. (5), (6), (17), (18a), (19), and (21a), we get the objective function corresponding to Eq. (11) as

$$U = F\left(\cdot\right) - wI^P - c\left(\cdot\right) - A\left(\cdot\right) - \beta\left(\cdot\right)\left\{\left[1 - G\left(\cdot\right)\right]\gamma I + \left[1 - \tilde{G}\left(\cdot\right)\right]\tilde{\gamma}N\right\} + \bar{R} - \rho E. \tag{22}$$

The FOCs corresponding to optimal policy choices of the immigration quota and proaction are, respectively,

$$U_I = \left[\left(\tilde{\gamma}\tilde{g} + w\tilde{\psi}_w\right)N + \left(\gamma g - \psi\right)I\right]w_I - A' - \gamma\beta\left(1 - G\right) = 0 \text{ and} \tag{23a}$$

$$\begin{aligned} U_E = {} & \left[\left(\tilde{\gamma}\tilde{g} + w\tilde{\psi}_w\right)N + \left(\gamma g - \psi\right)I\right]w_E \\ & -\gamma\beta'\left\{\left(1 - G + \frac{wg}{\beta}\right) + \frac{\tilde{\gamma}N}{\gamma I}\left[1 - \tilde{G} + \frac{w\tilde{g}}{\beta}\left(1 + \frac{w}{\beta}\right)\right]\right\}I - c' - \rho = 0. \end{aligned} \tag{23b}$$

Given that the model is a generalization of the baseline model, Eqs. (12a) and (12b) are nested in the above equations in the absence of domestic radicalization where $\tilde{\gamma} = 0$ and $\tilde{\psi} \equiv 1 \Rightarrow \tilde{\psi}_w = 0$. In Eq. (23a), domestic radicalization now adds the term $\left(\tilde{\gamma}\tilde{g} + w\tilde{\psi}_w\right)Nw_I < 0$ to the net marginal benefit of immigration, which captures two negative effects of an immigration-induced wage reduction. First, a fall in the wage rate drives more natives to choose terror. Second, as natives reduce their labor market participation $\tilde{\psi}$, less is produced and national income drops. Both costs reduce the attractiveness of immigration in the presence of native radicalization.

For the marginal impact of proaction in Eq. (23b), proactive measures also reduce the wage rate, again giving rise to increased terror and reduced labor participation. In contrast, at a given wage rate, proaction has direct terror-reducing effects, captured by the second term on the right-hand side of Eq. (23b). As in Eq. (12b), this term includes the dual proaction benefits of catching more terror volunteers and dissuading more potential volunteers. In addition, domestic radicalization amplifies proaction benefits through the term $\frac{\tilde{\gamma} N}{\gamma I}\left[1-\tilde{G}+\frac{w\tilde{g}}{\beta}\left(1+\frac{w}{\beta}\right)\right]$, inside the curly bracket in Eq. (23b). The term includes the dual benefits of capture and deterrence of native terrorists, and the output gain that occurs when more natives join the productive labor force. To summarize, domestic radicalization enhances both the wage-reduction-related costs of proaction and the direct benefits of proaction, so that unlike immigration, the effect of domestic radicalization on the desirability of proaction is unclear.

Proposition 1 suggested that an increase in $\rho$ reduces both proaction and immigration under a certain set of sufficient conditions which guarantee complementarity between these two policy variables. The current context is more complex because the desirability of immigration is somewhat compromised by adverse wage effects on the natives' terror participation. Proposition 4 summarizes our findings.

*Proposition 4*

A rise in the marginal disutility $\rho$ of proactive counterterror measures reduces optimal proactive effort; however, immigration may fall or rise. If the source nation of immigrants is terror-free, the labor demand function linear, and radicalization is uniformly distributed in the host nation, then a rise in $\rho$ must raise the immigration quota.

As earlier, an increase in $\rho$ must lead to a decrease in the optimal proaction level. Like Proposition 1, immigration falls if *I* and *E* are complements; however, the case for complementarity is weakened in the presence of native radicalization. At a given *E*, the condition for joining the terror organization is: $\theta = w/\beta(E) \Rightarrow d\theta/dw = 1/\beta(E)$. For high proactive measures, $\beta(E)$ is small so that $d\theta/dw$ is large, implying a sizable change in the cutoff level of $\theta$ for a unit change in the wage. Thus, when *E* is large, an immigration-induced drop in the wage redirects a lot of natives to the terror sector, which amplifies the adverse consequences of the wage reduction. There is also an amplification of the native labor supply elasticity at higher proaction levels that limits the wage-reduction benefit $w_I$ of immigration. Compared to Section 2, there are two new effects, both of which lower the marginal benefit of immigration at higher proaction levels – strengthening the case for substitutability between the two policy variables. However, the two policies' complementarity effects, outlined after Proposition 1, are qualitatively unchanged. Therefore, the aggregate effect of proaction on the marginal benefit of immigration is ambiguous with a rise in $\rho$, so that immigration may rise or fall.

The ambiguity about the immigration-proaction pattern is resolved in a polar case where all terrorism is domestic, such that $\gamma = 0$ and $\tilde{\gamma} > 0$. In this special case, only the substitutability aspect between proaction and immigration remains, which then ensures that a rise in $\rho$, reduces optimal proaction but lifts the optimal immigration quota.

Finally, to reconcile the seemingly opposing immigration policy implications of

Proposition 1 and the polar case of Proposition 4, we note that these are two extreme sub-cases of the general model of this section, where the latter model allows co-existence of native and foreign radicalization. In the real world, where both types of radicalizations exist (at varying degrees across nations), the immigration-reducing effects of $\rho$ (Proposition 1) are moderated by the presence of native radicalization. The typical immigration policy environment is perhaps more in line with Proposition 1, where less radicalized developed nations make immigration quota choices pertaining to some terror-prone source nations. Therefore, on balance, we can expect more liberal democracies to limit immigration due to terror considerations, which is in keeping with the empirical correlations shown regarding Proposition 1.

## 5. Concluding Remarks

As documented earlier, there is an empirical literature on how migrants from terror-prone source countries can bring terror attacks to the immigrants' destination or host country (Helbling and Meierrieks 2020, 2022). Among other issues, the empirical literature investigates immigration as a generator of destination-country terrorism. Adverse public opinion toward migrants is shown to be stronger for immigrants arriving from closer terror-plague countries (Böhmelt, Bove, and Nussio 2020). To our knowledge, there is a single theoretical treatment of terrorism and immigration, which, unlike the current study, focuses on how a source-country terrorist group's choice between skilled and unskilled laborers affects the export of terrorism. As such, the important policy choice of the destination country is the relative sizes of skilled and unskilled immigration quotas with larger skilled quotas being favored (Bandyopadhyay and Sandler 2014). In contrast, the current paper analyzes the destination country's immigration quota and its proactive counterterrorism measure as an interdependent choice. The current paper addresses the destination country's overall immigration quota and its proactive countermeasure while accounting for more stringent proactive responses affecting the disutility of lost freedoms. The disutility induces a tradeoff between limiting terror supply (curbing proactive measures) and reducing immigration through quotas in the destination country. As such, the theory indicates a complementarity, in some reasonable circumstances, between having smaller proactive measures and smaller immigration quotas. Key considerations are the elasticity of labor demand and the distribution of radicalization in the immigrant source country. Not only does our analysis link proactive countermeasures and immigration quotas in the destination country, but also integrates the labor market equilibrium in the destination country, thereby offering a unique vantage. The integration with the labor market is essential since immigration and proactive measures affect the destination country's labor market, thus influencing the market-clearing wage and the opportunity cost of terrorism.

The equilibrium of our baseline two-stage model is impacted by changes in two key parameters: the disutility of lost freedoms and the extent of source-country radicalization. Increases in this disutility, consistent with enhanced democratic freedoms, is shown to reduce both the optimal proactive effort and the optimal immigration quota when labor demand elasticity exceeds a requirement in the destination country. An empirical examination of 28 countries is consistent with enhanced democratic freedoms being correlated with more restrictive immigration quotas. A second comparative statics exercise involves enhanced radicalization in the source country, which generally shows that this augmented radicalization reduces the immigration quota while having an ambiguous effect on proactive measures. A second empirical exercise supports the negative relationship between source-country radicalization and more restrictive destination-country immigration. Extensions to the model allow for destination-country defensive and proactive measures, and destination-country radicalization. In the latter case, greater disutility of proactive measures still reduces optimal proactive effort but has an ambiguous influence on the immigration quota.

## Appendix

(1) *Proof of Proposition 1*

Differentiating Eqs. (12a) and (12b) and applying Cramer's rule, we obtain

$$\frac{dI}{d\rho} = -\frac{U_{IE}}{D} < 0 \text{, if and only if } U_{IE} > 0\text{; and } \frac{dE}{d\rho} = \frac{U_{II}}{D} < 0\,, \tag{A1}$$

where $U_{II} < 0$, $U_{EE} < 0$, and $D = U_{II}U_{EE} - (U_{IE})^2 > 0$ owing to the second-order conditions (SOCs). Differentiating the expression for $U_I$ in Eq. (12a) and noting that $g'(w/\beta) = 0$ for a uniform distribution, we derive

$$U_{IE} = -Iw_I(I,E)\left(\frac{d\psi}{dE}\right)_{|I} + \gamma\left[\beta g\frac{\partial(w/\beta)}{\partial E} - (1-G)\beta'\right] + I(\gamma g - \psi)\frac{\partial w_I(I,E)}{\partial E}\,, \tag{A2}$$

where $\psi \equiv \psi\left[w(I,E),E\right]$. Applying Eqs. (3b) and (10b), we can show that

$\left(\frac{d\psi}{dE}\right)_{|I} = \psi_w w_E + \psi_E > 0$ and $\frac{\partial\left[w(I,E)/\beta(E)\right]}{\partial E} > 0$. Therefore, given that $w_I < 0$ and $\beta' < 0$, the first two terms on the right-hand side of Eq. (A2) are positive. Eq. (12a) implies that $(\gamma g - \psi)I < 0$, so that a sufficient condition for the third term on the right-hand side of Eq. (12a) to be non-negative is $\frac{\partial w_I(I,E)}{\partial E} \equiv w_{IE} \le 0$. In turn, we infer that $U_{IE} > 0$ if $w_{IE} \le 0$.

If $F_{LLL} = 0$ [i.e., labor demand in Eq. (8) is linear], we can differentiate the expression for $w_I$ in Eq. (10b) after noting that $\psi \equiv \psi\left[w(I,E),E\right]$ and $\psi_w \equiv \psi_w\left[w(I,E),E\right]$, to obtain

$$w_{IE} = \frac{\psi_E F_{LL}\left(1 + \frac{I^P F_{LL}}{w}\right)}{\left(1 - IF_{LL}\psi_w\right)^2} \le 0 \Leftrightarrow 1 + \frac{I^P F_{LL}}{w} \ge 0\,, \tag{A3}$$

because $\psi_E > 0$ and $F_{LL} < 0$. Given Eq. (8), the labor demand elasticity equals

$\varepsilon = -\frac{L^{d\prime}(w)w}{L^d} = -\frac{w}{L^d F_{LL}}$, such that $1+\frac{I^P F_{LL}}{w} = 1+\left(\frac{I^P}{L^d}\right)\left(\frac{L^d F_{LL}}{w}\right) = 1-\frac{I^P}{L^d \varepsilon}$. Substituting the latter expression for $1+\frac{I^P F_{LL}}{w}$ in Eq. (A3) and evaluating the equation at the labor market equilibrium, $L^d = L^s = L$, we have

$$w_{IE} \leq 0 \text{ if and only if } \varepsilon \geq \frac{I^P}{L} = \frac{I^P}{N+I^P}. \tag{A4}$$

Eq. (A4) presents the elasticity-related sufficiency condition mentioned in the statement of Proposition 1, thereby completing the proof.

(2) *Proof of Proposition 2*

Differentiating Eqs. (12a) and (12b) and applying Cramer's rule, we obtain

$$\frac{dI}{d\gamma} = \frac{U_{IE}U_{E\gamma} - U_{EE}U_{I\gamma}}{D} \text{ and } \frac{dE}{d\gamma} = \frac{U_{IE}U_{I\gamma} - U_{II}U_{E\gamma}}{D}, \tag{A5}$$

where $U_{II} < 0$, $U_{EE} < 0$, and $D = U_{II}U_{EE} - (U_{IE})^2 > 0$ owing to SOCs.

Using Eq. (3a), we define $\psi(w,E;\gamma) \equiv 1-\gamma+\gamma G[w/\beta(E)]$, where $\psi_\gamma = G-1 < 0$. Substituting $\psi(w,E;\gamma)$ in Eq. (10a), we get $L^d(w) - N - \psi(w,E;\gamma)I = 0$, which implicitly defines $w = w(I,E;\gamma)$, where $w_\gamma = \frac{IF_{LL}\psi_\gamma}{1-IF_{LL}\psi_w} = \frac{IF_{LL}(G-1)}{1-IF_{LL}\psi_w} > 0$. Applying $w = w(I,E;\gamma)$ in $\psi(w,E;\gamma)$ gives $\psi = \psi[w(I,E;\gamma),E;\gamma]$. Using the latter function in Eq. (12a), we can express the marginal benefit of immigration as

$$U_I = \{\gamma g - \psi[w(I,E;\gamma),E;\gamma]\} I w_I(I,E;\gamma) - A'(I) - \gamma\beta(E)\left\{1-G\left[\frac{w(I,E;\gamma)}{\beta(E)}\right]\right\}. \tag{A6}$$

Differentiating Eq. (A6) we get the "own effect" of $\gamma$ on the marginal benefit of immigration,

$$U_{I\gamma} = I\left[g - \left(\frac{d\psi}{d\gamma}\right)_{|E,I}\right] w_I - \left(1 - G - \psi_w w_\gamma\right)\beta + \left(\gamma g - \psi\right) I w_{I\gamma} < 0, \tag{A7}$$

because $w_I < 0$, and we can show that $\left(\frac{d\psi}{d\gamma}\right)_{|E,I} = \psi_w w_\gamma + \psi_\gamma < 0$, $1 - G - \psi_w w_\gamma > 0$, $w_{I\gamma} > 0$, and $\gamma g - \psi < 0$.

From Eq. (A5), we have that $\frac{dI}{d\gamma} < 0$ if $U_{IE}U_{E\gamma} - U_{EE}U_{I\gamma} < 0$. Dividing the latter inequality by $U_{EE}U_{II} > 0$, and rearranging terms we get

$$\frac{dI}{d\gamma} < 0 \text{ if } -\frac{U_{I\gamma}}{U_{II}} < -\frac{U_{IE}U_{E\gamma}}{U_{EE}U_{II}}. \tag{A8}$$

Notice that Eqs. (12a) and (12b) can be expressed as $U_I\left(I, E; \gamma\right) = 0$ and $U_E\left(I, E; \gamma\right) = 0$, respectively. With the implicit function rule, these FOCs define

$$\left(\frac{dI}{dE}\right)_{|\gamma} = -\frac{U_{IE}}{U_{II}},\ \left(\frac{dI}{d\gamma}\right)_{|E} = -\frac{U_{I\gamma}}{U_{II}} < 0, \text{ and } \left(\frac{dE}{d\gamma}\right)_{|I} = -\frac{U_{E\gamma}}{U_{EE}}. \tag{A9}$$

Using Eq. (A9) and rearranging terms in Eq. (A8), we get

$$\frac{dI}{d\gamma} < 0 \text{ if } -\frac{U_{I\gamma}}{U_{II}} + \left(-\frac{U_{IE}}{U_{II}}\right)\left(-\frac{U_{E\gamma}}{U_{EE}}\right) = \left(\frac{dI}{d\gamma}\right)_{|E} + \left(\frac{dI}{dE}\right)_{|\gamma}\left(\frac{dE}{d\gamma}\right)_{|I} < 0. \tag{A10}$$

Given Eq. (A7), the own effect of $\gamma$ on *I*, $\left(\frac{dI}{d\gamma}\right)_{|E} = -\frac{U_{I\gamma}}{U_{II}}$, is strictly negative. Thus, if the cross effect $\left(\frac{dI}{dE}\right)_{|\gamma}\left(\frac{dE}{d\gamma}\right)_{|I}$ is non-positive, then $\frac{dI}{d\gamma} < 0$. If, however, the cross effect is strictly positive, then we need the own effect to dominate for $\frac{dI}{d\gamma} < 0$. This completes the proof of the first sentence of Proposition 2. The proof of the second sentence of Proposition 2 is in the

Online Appendix.

(3) *Proof of Proposition 3*

Let $D^* < 0$ be the 3x3 determinant corresponding to one of the SOCs underlying the optimal choices in Eqs. (16a)-(16c). Differentiating those equations and using Cramer's rule, we obtain

$$\frac{dI}{d\rho} = -\frac{U_{IE}U_{ZZ} - U_{EZ}U_{IZ}}{D^*}, \quad \frac{dE}{d\rho} = \frac{U_{II}U_{ZZ} - (U_{IZ})^2}{D^*} < 0, \quad \frac{dZ}{d\rho} = -\frac{U_{ZE}U_{II} - U_{IE}U_{IZ}}{D^*}, \qquad \text{(A11)}$$

where $U_{II}U_{ZZ} - (U_{IZ})^2 > 0$ from a SOC. The sign of the comparative-static effect $\frac{dE}{d\rho}$ in Eq. (A11) establishes the first sentence of Proposition 3. Case 1 below considers immigration-proaction substitutability, which is discussed in the second sentence of Proposition 3.

**Case 1**: $U_{IE} \leq 0$

We can show that $U_{EZ} < 0$ and $U_{IZ} > 0$. Noting that the SOCs require that $D^* < 0, U_{II} < 0$, and $U_{ZZ} < 0$, we have from Eq. (A11) that $U_{IE} \leq 0$ implies that $\frac{dI}{d\rho} > 0$ and $\frac{dZ}{d\rho} > 0$. This completes the proof of the second sentence of Proposition 3. The proof of the last sentence of Proposition 3 is in the Online Appendix.

(4) *Proof of Proposition 4*

Differentiating Eqs. (23a) and (23b), and applying Cramer's rule, we derive comparative statics that mirror Eq. (A1). Thus, $\frac{dE}{d\rho} < 0$; and $\frac{dI}{d\rho} < 0$ if and only if $U_{IE} > 0$. Differentiating $U_I$ with respect to *E* in Eq. (23a) and using a uniform density function give

$$U_{IE} = -Iw_I \left( \frac{d\psi}{dE} \right)_{|I} + \gamma \left[ \beta g \frac{\partial (w/\beta)}{\partial E} - (1-G)\beta' \right]$$

$$+\left[\left(\tilde{\gamma}\tilde{g}+w\tilde{\psi}_w\right)N+\left(\gamma g-\psi\right)I\right]\frac{\partial w_I\left(I,E\right)}{\partial E}+N\tilde{\gamma}\tilde{g}\frac{\partial\left(w/\beta\right)}{\partial E}w_I\,, \tag{A12}$$

which differs from the corresponding expression in Eq. (A2). As in Eq. (A2), the first two right-hand terms of Eq. (A12) can be shown to be positive. From Eq. (23a), we have $\left(\tilde{\gamma}\tilde{g}+w\tilde{\psi}_w\right)N+\left(\gamma g-\psi\right)I<0$, so that the third right-hand term of Eq. (A12) is non-negative if $\frac{\partial w_I\left(I,E\right)}{\partial E}\equiv w_{IE}\le 0$. However, since $\frac{\partial\left(w/\beta\right)}{\partial E}>0$ and $w_I<0$, the last term of Eq. (A12) is negative. Therefore, unlike Section 3, $w_{IE}\le 0$ is no longer a sufficient condition to ensure complementarity between *I* and *E*, resulting in ambiguity in the sign of $\frac{dI}{d\rho}$.

If there is no radicalization in the immigrants' source nation but there is radicalization of *H*'s natives, such that $\gamma=0$ and $\psi\equiv 1$, but $\tilde{\gamma}>0$, then Eq. (A12) reduces to

$$U_{IE}=\left[\left(\tilde{\gamma}\tilde{g}+w\tilde{\psi}_w\right)N-I\right]w_{IE}+N\tilde{\gamma}\tilde{g}\frac{\partial\left(w/\beta\right)}{\partial E}w_I\,. \tag{A13}$$

Assuming $F_{LLL}=0$, we differentiate the expression for $w_I\left(I,E\right)$ given in Eq. (21b), and use $\gamma=0$ and $\psi\equiv 1\Rightarrow\psi_E=\psi_w=0$, to get

$$w_{IE}=-\frac{N\left(F_{LL}\right)^2\tilde{\gamma}\tilde{g}\beta'}{\left[\left(1-NF_{LL}\tilde{\psi}_w\right)\beta\right]^2}>0\,. \tag{A14}$$

For $\gamma=0$ and $\psi\equiv 1$, Eq. (23a) yields $\left(\tilde{\gamma}\tilde{g}+w\tilde{\psi}_w\right)N-I<0$, such that using Eq. (A14) and noting that $N\tilde{\gamma}\tilde{g}\frac{\partial\left(w/\beta\right)}{\partial E}w_I<0$, Eq. (A13) yields $U_{IE}<0$. In turn, we get $\frac{dI}{d\rho}=-\frac{U_{IE}}{D}>0$, when there is no source-nation radicalization, as claimed in the last sentence of Proposition 4.

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Table 1. Correlation between democracy and immigration policy

| | *Electoral* | *Liberal* | *Participatory* | *Polity 2* |
|---|---|---|---|---|
| | | *1970-2013* | | |
| Immigration Policy | -0.37 | -0.40 | -0.39 | -0.33 |
| Nationality | -0.28 | -0.33 | -0.31 | -0.24 |
| Quota | -0.18 | -0.20 | -0.19 | -0.16 |
| Immigrant Rights | 0.41 | 0.38 | 0.40 | 0.38 |
| | | *1970-1989* | | |
| Immigration Policy | -0.28 | -0.30 | -0.31 | -0.26 |
| Nationality | -0.26 | -0.29 | -0.27 | -0.24 |
| Quota | -0.07 | -0.08 | -0.09 | -0.06 |
| Immigrant Rights | 0.33 | 0.32 | 0.31 | 0.29 |
| | | *1990-2000* | | |
| Immigration Policy | -0.47 | -0.53 | -0.47 | -0.40 |
| Nationality | -0.36 | -0.44 | -0.42 | -0.28 |
| Quota | -0.32 | -0.37 | -0.32 | -0.27 |
| Immigrant Rights | 0.57 | 0.53 | 0.56 | 0.57 |
| | | *2001-2013* | | |
| Immigration Policy | -0.41 | -0.45 | -0.38 | -0.39 |
| Nationality | -0.29 | -0.35 | -0.33 | -0.21 |
| Quota | -0.26 | -0.29 | -0.22 | -0.24 |
| Immigrant Rights | 0.41 | 0.34 | 0.41 | 0.39 |

Table 2. Average immigration policy score by regime type

| | *Average Immigration Policy score* | | | |
|---|---|---|---|---|
| *Regime type* | *1970-2013* | *1970-1989* | *1990-2000* | *2001-2013* |
| Democracy | -1.02 | -0.91 | -1.07 | -1.15 |
| Non-democracy | -0.48 | -0.50 | -0.34 | -0.52 |
| p-value (diff) | 0.00 | 0.00 | 0.00 | 0.00 |

Table 3. Terrorism in migrants' countries of origin and destination countries' immigration policies

| | All source countries of migrants | | | | Major source countries of migrants | | | |
|---|---|---|---|---|---|---|---|---|
| | Immigration Policy | | Quota | | Immigration Policy | | Quota | |
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 | Model 8 |
| *TICO/TT* | -0.595*** | -0.596*** | -0.704** | -0.681** | -0.964*** | -0.987*** | -2.259*** | -2.320*** |
| | (0.119) | (0.125) | (0.284) | (0.294) | (0.158) | (0.158) | (0.352) | (0.362) |
| Time Effects | No | Yes | No | Yes | No | Yes | No | Yes |
| N | 567 | 567 | 567 | 567 | 567 | 567 | 567 | 567 |

*Notes*: Significance levels: *** is <.01, ** is <.05, and * is <.10. Robust standard errors are in parentheses. *TICO/TT* is the ratio of the total terrorist attacks in migrants' source countries to the total terrorist attacks in the world. Major source countries of migrants include countries whose nationals constitute at least 1% of total migrants in a destination country in a given year.

**Online Appendix**

(1) *Deriving Eqs. (12a) and (12b)*

Differentiating Eq. (11) gives

$$dU = F_L dI^P - w dI^P - I^P dw - c' dE - A' dI - \gamma d\left\{\beta(E)\left[1 - G\left(\frac{w}{\beta(E)}\right)\right]I\right\} - \rho dE. \qquad \text{(B1)}$$

From Eq. (8), we have $w = F_L$, so that the first two terms on the right-hand side of Eq. (B1) cancel. Furthermore, using Eq. (10b), we derive $dw = w_I dI + w_E dE$, which is substituted for $dw$ in Eq. (B1). Routine calculations and reorganization of terms then yield

$$dU = \left[(\gamma g - \psi) I w_I - A' - \gamma\beta(1 - G)\right] dI$$

$$+\left[(\gamma g - \psi) I w_E - \gamma\beta'\left(1 - G + \frac{wg}{\beta}\right) I - c' - \rho\right] dE. \qquad \text{(B2)}$$

At an interior optimum, Eq. (B2) yields the FOCs in Eqs. (12a) and (12b) for *I* and *E*, respectively.

(2) *Supporting claims made in the proof of Proposition 1*

We show first that $\left(\frac{d\psi}{dE}\right)_{|I} > 0$, then show that $\frac{\partial\left[w(I,E)/\beta(E)\right]}{\partial E} > 0$, and finally show the derivation of the first equation in Eq. (A3).

Using Eq. (10b) for the expression of $w_E$, we get

$$\left(\frac{d\psi}{dE}\right)_{|I} = \psi_w w_E + \psi_E = \psi_w \frac{I\psi_E F_{LL}}{1 - I\psi_w F_{LL}} + \psi_E. \qquad \text{(B3)}$$

Factoring out $\psi_E$ from the last two terms in Eq. (B3) and simplifying give

$$\left(\frac{d\psi}{dE}\right)_{|I} = \frac{\psi_E}{1 - I\psi_w F_{LL}} > 0, \qquad \text{(B4)}$$

because $F_{LL} < 0$, $\psi_E > 0$, and $\psi_w > 0$, where the last two inequalities are tied to Eq. (3b).

Notice that

$$\frac{\partial\left[w(I,E)/\beta(E)\right]}{\partial E} = \frac{1}{\beta}\left(w_E - \frac{w\beta'}{\beta}\right). \tag{B5}$$

Using the expression for $w_E$ given in Eq. (10b) and noticing from Eq. (3b) that $\frac{\psi_E}{\psi_w} = -\frac{w\beta'}{\beta}$, we can write

$$w_E - \frac{w\beta'}{\beta} = \frac{I\psi_E F_{LL}}{1 - I\psi_w F_{LL}} + \frac{\psi_E}{\psi_w}. \tag{B6}$$

Factoring out $\psi_E$ from the last two terms in Eq. (B6) and simplifying, we get

$$w_E - \frac{w\beta'}{\beta} = \frac{\psi_E}{\psi_w(\bullet)(1 - I\psi_w F_{LL})} > 0. \tag{B7}$$

Based on Eq. (B7) in Eq. (B5), we establish that $\frac{\partial\left[w(I,E)/\beta(E)\right]}{\partial E} > 0$ .

Turning to Eq. (A3), we differentiate the expression for $w_I$ (at a given *I*) and use the constancy of $F_{LL}$ to write

$$w_{IE} = \frac{F_{LL}}{1 - I\psi_w F_{LL}}\left(\frac{d\psi}{dE}\right)_{|I} + \frac{(F_{LL})^2 \psi I}{(1 - I\psi_w F_{LL})^2}\left(\frac{d\psi_w}{dE}\right)_{|I}. \tag{B8}$$

Given Eq. (3b), we note that $\psi_{ww} = 0$, such that $\left[\frac{d\psi_w(w(I,E),E)}{dE}\right]_{|I} = \psi_{wE}$. In turn, notice from Eq. (3b) that $\psi_{wE} = -\frac{\gamma g\beta'}{\beta^2} = \frac{\psi_E}{w}$. Substituting $\frac{\psi_E}{w}$ for $\left(\frac{d\psi_w}{dE}\right)_{|I}$ in Eq. (B8) and also using Eq. (B4) to substitute $\frac{\psi_E}{1 - I\psi_w F_{LL}}$ for $\left(\frac{d\psi}{dE}\right)_{|I}$ in Eq. (B8), we get

$$w_{IE} = \frac{F_{LL}\psi_E}{\left(1-I\psi_w F_{LL}\right)^2} + \frac{\left(F_{LL}\right)^2 \psi I \psi_E}{\left(1-I\psi_w F_{LL}\right)^2 w}. \tag{B9}$$

Factoring out $\frac{F_{LL}\psi_E}{\left(1-I\psi_w F_{LL}\right)^2}$ from the right-hand side and using $\psi I = I^P$, we get Eq. (A3).

(3) *Supporting claims made in the first part of the proof of Proposition 2*

We show below that $\left(\frac{d\psi}{d\gamma}\right)_{|E,I} = \psi_w w_\gamma + \psi_\gamma < 0$, $1-G-\psi_w w_\gamma > 0$, $w_{I\gamma} > 0$, and $\gamma g - \psi < 0$ as claimed below Eq. (A7).

Using the expressions for $\psi_w$, $\psi_\gamma$, and $w_\gamma$ noted below Eq. (A5), we get

$$\psi_w w_\gamma + \psi_\gamma = \psi_w \frac{IF_{LL}\left(G-1\right)}{1-IF_{LL}\psi_w} + G - 1. \tag{B10}$$

Factoring out $\left(G-1\right)$ from the right-hand terms and simplifying yield

$$\left(\frac{d\psi}{d\gamma}\right)_{|E,I} = \psi_w w_\gamma + \psi_\gamma = \frac{G-1}{1-IF_{LL}\psi_w} < 0. \tag{B11}$$

Using Eq. (B11) and noting that $\psi_\gamma = G-1$, we have

$$1-G-\psi_w w_\gamma = -\left(\psi_w w_\gamma + G - 1\right) = -\left(\psi_w w_\gamma + \psi_\gamma\right) > 0. \tag{B12}$$

Differentiating $w_I$ after noting that $w = w\left(I,E;\gamma\right)$ and $\psi = \psi\left[w\left(I,E;\gamma\right),E;\gamma\right]$, and using $F_{LLL} = 0$, we get

$$w_{I\gamma} = \frac{F_{LL}}{1-IF_{LL}\psi_w}\left(\frac{d\psi}{d\gamma}\right)_{|E,I} + \frac{\left(F_{LL}\right)^2 \psi I}{\left(1-IF_{LL}\psi_w\right)^2}\left(\frac{d\psi_w}{d\gamma}\right)_{|E,I} > 0. \tag{B13}$$

Based on Eq. (B11) and $F_{LL} < 0$, the first term on the right-hand side of Eq. (B13) is positive, and the second term is also positive (given Eq. (3b)), because we know that $\psi_w\left(w,E\right) = \frac{\gamma g}{\beta}$, such that $\left(\frac{d\psi_w}{d\gamma}\right)_{|E,I} = \frac{g}{\beta} > 0$.

Finally, $\gamma g - \psi < 0$ from Eq. (12a).

(4). *Proof of second part of Proposition 2*

Using the expression for the marginal benefit of proaction, $U_E$, in Eq. (12b), and applying the same methods for deriving Eqs. (A6) and (A7), we have

$$U_{E\gamma} = I\left\{\left[g - \left(\frac{d\psi}{d\gamma}\right)_{|E,I}\right]w_E - \beta'(E)\left(1 - G + \frac{wg}{\beta}\right) + (\gamma g - \psi)w_{E\gamma}\right\}. \tag{B14}$$

Based on Eq. (B11), $\left(\frac{d\psi}{d\gamma}\right)_{|E,I} < 0$, such that the first term inside the curly bracket in Eq. (B14) is negative because $w_E < 0$. The second term inside the curly bracket is positive because $\beta' < 0$ and $G < 1$. Turning to the third term, differentiating $w_E$, and assuming $F_{LLL} = 0$, we get

$$w_{E\gamma} = \frac{IF_{LL}g}{(1 - IF_{LL}\psi_w)^2 \beta}\left[\psi_E IF_{LL} - \frac{(w + \gamma w_\gamma)(1 - IF_{LL}\psi_w)\beta'}{\beta}\right]. \tag{B15}$$

Consider the term inside the square bracket,

$$\psi_E IF_{LL} - \frac{(w + \gamma w_\gamma)(1 - IF_{LL}\psi_w)\beta'}{\beta}.$$

$$= IF_{LL}\left(\psi_E + \frac{\psi_w w\beta'}{\beta} + \frac{\gamma\psi_w w_\gamma \beta'}{\beta}\right) - \frac{(w + \gamma w_\gamma)\beta'}{\beta}. \tag{B16}$$

From Eq. (3b), we have that $\psi_E + \frac{\psi_w w\beta'}{\beta} = 0$, so that Eq. (B16) reduces to

$$\psi_E IF_{LL} - \frac{(w + \gamma w_\gamma)(1 - IF_{LL}\psi_w)\beta'}{\beta} = IF_{LL}\frac{\gamma\psi_w w_\gamma \beta'}{\beta} - \frac{(w + \gamma w_\gamma)\beta'}{\beta} > 0, \tag{B17}$$

since $F_{LL} < 0$, $\beta' < 0$, and $w_\gamma > 0$. Eqs. (B15) and (B17) establish that $w_{E\gamma} < 0$. Given $\gamma g - \psi < 0$ and $w_{E\gamma} < 0$, the last term inside the curly bracket in Eq. (B14) is positive. The opposing signs of the terms inside the curly bracket in Eq. (B14) indicate that the "own effect" of $\gamma$ on the marginal benefit of proaction, $U_{E\gamma}$, is ambiguous. To clearly see why optimal $E$ could either rise or fall in response to an increase in $\gamma$, consider the case where the sufficiency conditions of Proposition 1 hold, such that $U_{IE} > 0$. Furthermore, $U_{II} < 0$ and $U_{I\gamma} < 0$. Using these facts in Eq. (A5), we get $\frac{dE}{d\gamma} = \frac{U_{IE}U_{I\gamma} - U_{II}U_{E\gamma}}{D} < 0$ if $U_{E\gamma} < 0$. If, however, $U_{E\gamma} > 0$, and this own effect strictly dominates the cross effect from the term $U_{IE}U_{I\gamma}$ in Eq. (A5), then $\frac{dE}{d\gamma} > 0$. Thus, optimal proaction can rise or fall in response to an increase in the inherent radicalization parameter, $\gamma$, which completes the proof of Proposition 2.

(5) *Deriving Eqs. (16a), (16b), and (16c):*

Differentiating Eq. (15) and then following steps similar to those to derive Eqs. (12a) and (12b), we obtain Eqs. (16a) through (16c).

(6) *Supporting claims made in the first part of the proof of Proposition 3*

We show here that $U_{IZ}$ is positive and $U_{EZ}$ is negative (see text following Eq. (A11)).

Differentiating the expression for $U_I$ in Eq. (16a), we get

$$U_{IZ} = \gamma\mu'(z)\left[Igw_I - \beta(1-G)\right] > 0, \tag{B18}$$

because $\mu'$ and $w_I$ are negative.

Similarly, differentiating the expression for $U_E$ in Eq. (16b), we have

$$U_{EZ} = \gamma\mu'(z) I \left[ g w_E - \left( 1 - G + \frac{gw}{\beta} \right) \beta' \right], \tag{B19}$$

where

$$g w_E - \left( 1 - G + \frac{gw}{\beta} \right) \beta' = -\beta'(1-G) + g\left( w_E - \frac{w\beta'}{\beta} \right) > 0, \tag{B20}$$

because $w_E - \dfrac{w\beta'}{\beta} > 0$ from Eq. (B7). Using Eqs. (B19) and (B20), we have that $U_{EZ} < 0$.

(7). *Proof of last sentence of Proposition 3*

**Case 2**: $U_{IE} > 0$ (Immigration-Proaction Complementarity)

From Eq. (A11), the sign of $\dfrac{dI}{d\rho}$ is determined by that of the expression $U_{IE}U_{ZZ} - U_{EZ}U_{IZ}$. The first term, $U_{IE}U_{ZZ}$, is negative if $U_{IE} > 0$, because $U_{ZZ} < 0$. However, the second term, $-U_{EZ}U_{IZ}$, is positive because $U_{IZ} > 0$ and $U_{EZ} < 0$. Thus, there is ambiguity in the direction of change of the optimal immigration quota when $U_{IE} > 0$. There is a similar ambiguity in signing $\dfrac{dZ}{d\rho}$. Those ambiguities are noted in the first part of the last sentence of Proposition 3.

Finally, note from Eq. (A11) that $\dfrac{dI}{d\rho} > 0$ implies that $U_{IE}U_{ZZ} - U_{EZ}U_{IZ} > 0$. Dividing this last inequality through by $U_{IZ} > 0$ and rearranging terms, we have

$$\frac{dI}{d\rho} > 0 \Rightarrow U_{EZ} < \frac{U_{IE}U_{ZZ}}{U_{IZ}} < 0; \text{ or } \frac{dI}{d\rho} > 0 \Rightarrow |U_{EZ}| > \left| \frac{U_{IE}U_{ZZ}}{U_{IZ}} \right|. \tag{B21}$$

Using the last inequality in Eq. (B21) and the numerator on the right-hand side of the last equality in Eq. (A11), we get

$$U_{ZE}U_{II} - U_{IE}U_{IZ} = |U_{EZ}||U_{II}| - U_{IE}U_{IZ}$$

$$> \left| \frac{U_{IE} U_{ZZ}}{U_{IZ}} \right| \left| U_{II} \right| - U_{IE} U_{IZ} = \frac{U_{IE} \left[ U_{ZZ} U_{II} - \left( U_{IZ} \right)^2 \right]}{U_{IZ}} > 0 , \qquad \text{(B22)}$$

because $U_{IE} > 0$, $U_{IZ} > 0$, and $U_{ZZ}U_{II} - \left(U_{IZ}\right)^2$ based on the SOCs. Using Eqs. (B21) and (B22) in Eq. (A11), we conclude that if $\frac{dI}{d\rho} > 0$, then $\frac{dZ}{d\rho} > 0$, which establishes the last part of the last sentence in Proposition 3.

(8) *Deriving Eqs. (23a) and (23b)*

Differentiating Eq. (22) and following steps used to derive Eqs. (12a) and (12b), we obtain Eqs. (23a) and (23b).

Table A1. List of sample countries

| | | | |
|---|---|---|---|
| Argentina | Chile | Netherlands | Spain |
| Australia | Denmark | New Zealand | Sweden |
| Austria | France | Norway | Switzerland |
| Belgium | Germany | Saudi Arabia | Taiwan |
| Botswana | Ireland | Singapore | United Kingdom |
| Brazil | Japan | South Africa | United States of America |
| Canada | Kuwait | South Korea | Venezuela |