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Trading for Peace

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Trading for Peace*

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Abstract

I examine the conditions under which trade can support peaceful coexistence and prosperity when particular ethnic groups are cheap targets of violence. A simple theoretical framework reveals that for a broad set of cases, while inter-ethnic competition generates incentives for violence, the presence of non-replicable, non-expropriable inter-ethnic complementarities become necessary to sustain peaceful coexistence over long time horizons. In addition to complementarity, two further conditions are important for deterring violence over time. When relatively mobile ethnic groups (eg immigrants) are vulnerable, a credible threat to leave can deter violence. When less mobile (indigenous) groups are vulnerable, high monitoring costs that allow them to withhold production can improve their gains from trade. I describe the implications for indigenous entrepreneurship and cultural assimilation, the development of local institutions supporting inter-ethnic trust, immigration policies and policies aimed at mitigating ethnic violence through financial innovations. I illustrate these implications using contemporary evidence and historical cases of organizations and institutions created to engender trade and support peace drawn from Africa, Asia Europe and Latin America.

1 Introduction

By 2006, Vivek Garg, a Captain in the Indian Army's Assam Regiment, had already seen his share of violent conflict. Having served for more than decade in anti-insurgency, combat

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and peacekeeping roles in Kashmir and the tribal Northeast of India, Vivek had commanded military units in regions that had suffered some of the world's most persistent ethnic conflicts. A turning point for Vivek came when a Kashmiri villager made a call from his mobile phone that detonated a bomb that killed a soldier under Vivek's command. When questioned, the villager explained that he had been handed the phone by local militants and told that the phone call would simply notify them of the army's presence, rather than directly triggering the fatal explosion.

For Vivek, this was a visceral example of a broader conclusion often all-too-slowly attained by counter-insurgency operations more generally: that a key to peacemaking lies in developing *community-level* support for peace. Disillusioned with the predominant strategies for peacemaking used at the time by the Indian government, which focused instead on projecting military force, Vivek resigned from the army to pursue a different approach.[1]

Drawing on his army savings, Vivek founded *Business Alternatives for Peace, Action and Reconstruction*, its acronym *BAPAR* also being a common word for "trade" in several Indian languages. Vivek's initial approach was to provide opportunities for local artisans in conflict zones to derive greater benefits from the crafts that they produced so that violence was a less desirable alternative. In that sense, Vivek's initiative paralleled in spirit, and at a micro level, the underlying logic of economic aid provided by the member states of the European Union, the United States and others to many regions undergoing conflict.[2] Yet, as with other such initiatives, lingering concerns remained: improving the wealth of communities in conflict zones without changing the incentives for peace could simply increase the spoils from violence, or even finance more conflict.[3]

Vivek's on-the-ground problem-solving also rapidly ran into these issues of extortion under the threat of violence. Vivek had decided to expand his initiative to the villages of former soldiers under his command. The recruitment ground for his regiment included the state of Manipur in the northeast of India, a hilly region riven by both religious and ethnic divisions. The mainly Christian Nagas and Kukis dominate parts of the countryside, with sizeable pop-

[1]This account is drawn in part from personal interviews the author had with Vivek Garg when he was a MSx student at the Stanford Graduate School of Business in 2012-2013. See also Snyder (2013). I am grateful to Vivek for sharing his experiences.

[2]See for example, USAID (2011) and USAID (2016).

[3]Indeed, the latter concern has led the current Indian government to limit NGO initiatives in conflict zones.

ulations living astride the major highways that wend into the Manipur valley. The strategic implications of controlling the only viable access to the capital, Imphal, was not lost on Naga organizations like the National Socialist Council of Nagaland (NSCN). Along with orchestrating violent insurgency, the NSCN used its ability to command the national highways to regularly extort payments from traffic and impose economic blockades on the capital for months at a time.[4] Imphal and the Manipur valley itself is the focus of the historically politically dominant Meitei ethnic group, comprised mainly of Hindus but also with a number of Muslim communities.[5]

Initially Vivek had worked with groups of female entrepreneurs from both a Naga Christian community that lived astride the National Highway and Muslim Meiteis who lived deeper in the valley. From each, BAPAR provided loans and orders for shawls and handloom products, with the patterns requested often specific to each community's rich cultural heritage and traditions. All repaid their micro-loans, and orders were coming in. However, in March 2010, the recurrent extortion which raised the input prices for the Meiteis, coupled with a broader 121 day blockade, led to default by eight out of fourteen Meitei entrepreneurs. It seemed that the political challenges of working a conflict zone would undermine BAPAR's promising start.

Yet, faced with these challenges Vivek pivoted once more. Instead of sourcing separately from each community, BAPAR now placed a new take-it-or-leave it order for the Naga artisans on the highway that contained three novel features. First, the order was potentially lucrative but large, in fact, too large for the Naga artisans to complete on their own. Second, Vivek included in the order a requirement that it include shawls and other handlooms with the distinctive designs and palette of the Meitei community. Third, the order required that the sourcing of raw materials and final product should be delivered as one, requiring cooperation between members of both communities. After much deliberation, and facilitated by BAPAR, the Naga women travelled for eight hours to attend a lunch with the Meitei women to forge the possibility of work and trade together. A new joint venture was born.

Further, despite the long history of ethnic tension and animosity between the groups, the

[4]There are 26 permanent insurgent-run extortion checkpoints on the two major highways into Imphal. See the Center for Development and Peace studies,*http://cdpsindia.org/manipur_insurgency.asp*, accessed May, 2017.

[5]During the British Raj, Manipur had in fact remained an indirectly-ruled Hindu kingdom, and only formally acceded to India in 1949. While Hindus and Christians have very similar populations in Manipur as a whole (41.39% vs 41.29% respectively, as of 2011), urban Manipur continues to be strongly Hindu (64.39%), while Christians dominate rural areas (52.8%).

venture was a success. The groups negotiated collectively with both raw material vendors, and with retailers, improving margins by 37%. The economic shared interests also appears to have deepened trust that led to collaborations in new opportunities in other areas. The Naga women also offered the same (pre-extortion) prices for broader commodities to the Meiteis that they enjoyed, thereby implicitly exempting them from the insurgents' ethnic tolls. And later, when the Meiteis received a non-BAPAR order, they brought the Naga women into the order as well. The women's business groups have since helped each other during humanitarian crises that have hit the region.

It might at first seem obvious that groups that trade with one another are less like to engage in violence.[6] Yet, while the development of trade promises much to societies in the way of economic and political development, instead it often delivers inter-ethnic conflict and the impoverishment of indigenous communities. Vulnerable societies living in resource-rich areas often find themselves rapidly displaced or exploited, as the history of the Dakota Sioux in the Black Hills of the United States, Congolese in rubber producing areas, or the native populations of Peru and Mexico in mining regions can readily attest. And as the examples of the ethnic Chinese in Indonesia to South Asians in East Africa to Jews in Europe show, historical and contemporary examples abound of even the most commercially-oriented minority groups becoming repeated targets of ethnic violence and expropriation (Benbassa and Rodrigue, 2000, Landa, 1994, Chua, 2003, Jha, 2007).

Under what conditions then can vulnerable communities survive and even thrive in environments where trade is possible but violence is cheap? How do such conditions alter ethnic identities and political institutions? In this paper I present a simple theoretical framework (with the formal model and results provided in an Appendix) that examines the conditions under which trade can lead societies towards civil conflict and dispossession and the conditions under which it can fulfil its promise of fostering peaceful co-existence and the material uplift-ment of vulnerable groups. I substantiate the assumptions and the predictions of the model drawing upon detailed case studies and summarizing broad empirical evidence from historic

[6] That a link existed between the two was apparent to Montesquieu (1748)[Book 20, pg.1], who proposed that "Commerce is a cure for the most destructive prejudices; for it is almost a general rule that wherever the ways of man are gentle there is commerce; and wherever there is commerce, there the ways of men are gentle." See also Hirschman (1977) and Polachek and Seiglie (forthcoming) on trade between nations.

and contemporary patterns of violence and tolerance between Muslims and Hindus in South Asia (Jha, 2014, 2013b), the history of Jews in Europe, and the relative success of vulnerable indigenous groups in Latin America (Diaz-Cayeros and Jha, 2017), and elsewhere. While doing so I emphasize both the testable implications of the model for further research and directions for policy.

In the basic model, agents are repeatedly matched and play a modified two-sided prisoner's dilemma game, where 'fink' is interpreted as violently seizing the production of the other agent. There are two departures from the classic two-sided prisoner's dilemma. First, I distinguish between two types of agent, labeled "locals" (or "indigenous") and "non-locals". The only initial differences between the two is that non-locals have better options outside the economy.[7] Second, individuals produce goods that impose an externality on others that produce those goods: agents producing the same good always act as substitutes, reducing the payoffs to one another from production, while agents producing different goods may provide either complements or substitutes to each other, respectively raising or lowering one another's payoffs (Please see Appendix).

The paper focuses on finding strategies that support *peaceful co-existence* over time: a subgame perfect equilibrium where no one prefers to leave, everyone produces at the socially optimal level and no one prefers to *fink*- attempt to violently seize production. The distinction between locals and non-locals further motivates the study of two particular cases of interest: one under which there are *vulnerable indigenous*– common in Latin America– and the other under which there are *vulnerable outsiders*– a common environment where there are immigrant minorities. In both cases, the model highlights the importance of inter-ethnic complementarities in supporting peaceful coexistence equilibria over long time horizons. Further, the model suggests that, over long time horizons and for a range of parameters, peaceful coexistence requires that the sources of the inter-ethnic complementarity be costly to replicate or expropriate. In contrast, the model suggests that when ethnic groups compete or when the source of inter-ethnic complementarity is easy for one group to expropriate or replicate, incentives for ethnic

[7] One can think of the distinction between local and non-local agents reflecting the common environment where members of one ethnic group are 'sons of the soil', having remained in a location for a relatively longer time, and thus tend to have more endowments, information and networks concentrated locally, than for 'non-local' agents that are relative newcomers or may enjoy superior information and networks outside a particular location. This can make leaving more costly for the former than for the latter.

violence actually become accentuated over long time horizons.

Beyond these general conditions, however, peaceful co-existence requires at least one additional element in each of the two cases of interest. In the *vulnerable outsiders* case common to many commercially-oriented ethnic minorities, I show that peaceful coexistence hinges on the possibility of leaving: whether the outside options for non-local groups that provide complementary services are sufficiently attractive that vulnerable groups providing complements can credibly threaten to leave if targeted with violence. I illustrate and substantiate this case drawing upon the cases of Muslim traders in South Asia and Jews in Europe, and empirical evidence in Jha (2013b). But in other situations, such as among the tribal communities in Manipur that BAPAR confronted, or the *vulnerable indigenous* case more generally, the threat of a group leaving a particular locality is often not as credible. In this case, I show how peaceful coexistence can instead be supported by the threat that vulnerable groups that provide complementary services withhold their effort. The latter requires there to be some friction, such as high monitoring costs, that prevents the strong from using the threat of violence to simply coerce effort from the weak. To illustrate and substantiate this case, I will discuss evidence that suggests how such complementarities and such a contractual environment existed in the case of the indigenous producers engaged in the cochineal trade in New Spain (Diaz-Cayeros and Jha, 2017), and in the case of opium in Western India, leading to survival in the face of colonial conquest and the development of successful indigenous entrepreneurs.

I next describe how this condition links inter-ethnic complementarities and competition with international immigration policies in potentially inducing *waves of ethnic pogroms* on one hand, or *contagions of ethnic tolerance* on the other. If a vulnerable outsider group provides complements, then an increase in immigration restrictions in one location reduces the credibility that vulnerable groups will credibly leave other locations in response to violence, facilitating violence in each place, and potentially creating a *wave of ethnic pogroms*. However, the reverse is also true: permissive immigration policies in one location may improve the outside option and make leaving in response to violence more credible elsewhere, reducing incentives for violence in other locations in a manner which also may cascade. Both patterns are reversed in environments where ethnic groups provide substitutes and compete– permissive immigration policies in one location make it less costly to displace ethnic competitors in another through violence, increasing

incentives for conflict. I will discuss evidence which appears consistent with these patterns.

I finally describe how the presence of a non-violent means of redistributive transfers of the surplus from trade can provide an alternative but complementary means to mitigate incentives for inter-ethnic violence. However, the framework highlights a key incentive problem: what transfers do occur will be from rich non-locals to a particular set of locals: the "strong" (often incumbent political elites), as these have the lowest costs of engaging in violence. In fact, these transfers of protection money to rulers by non-local ethnic groups, sometimes called "ethnic cronyism", may actually provide perverse incentives for rulers to intermittently allow ethnic violence by poorer locals in order to extract greater transfers from non-local minorities. I describe how these patterns fit failures of tolerance such as faced by commercially-oriented ethnic minorities, including Jews in Spain, Chinese merchants in Suharto's Indonesia, and South Asian businesspeople in Moi's Kenya, and contrast these with the strategies used by some ethnic organizations, particularly the Ismailis in East Africa, in successfully addressing these issues. I finally discuss the successes and failures of alternative policies, such as the provision of inter-ethnic shareholding arrangements in Japan, Malaysia and South Africa, and how a series of new field experiments providing shares across groups in Israel (Jha and Shayo, 2016) may shed new light for policies in this domain as well.

2 Conceptual Framework

Under what conditions can vulnerable communities survive and even thrive in environments where trade is possible but violence is cheap? Consider a location, like a town, where agents are repeatedly interact and play a modified two-sided prisoner's dilemma game, where 'fink' is interpreted as violently seizing the production of the other agent. There are two departures from the classic two-sided prisoner's dilemma. First, there are two types of agent, labeled *locals* and *non-locals*. The only initial difference between the two is that non-locals have better options outside the economy. We also allow one members of group to more vulnerable– in the sense that they have have less capacity for organizing violence– than the other. The Appendix provides a more complete technical treatment.

Regardless of their initial military capacity and their outside options, I consider an envi-

ronment where every period agents have the following choices. First, they can choose to leave– which, as we mentioned, is easier for those with better outside options. Second, if they stay, they can choose whether or not to produce a unit of a good. Producing the good affects the payoff to the production of others. Individuals producing the same good always act as substitutes (i.e. are economic competitors), reducing the payoffs to one another from production. In contrast, individuals producing different goods may provide either substitutes or *complements*: i.e. produce goods or services that benefit the value of the production of the other group.[8] Finally, individuals are matched and can choose to engage in violence against the person they are matched with. Violence is destructive, and the probability of victory increases with the difference between the individuals' initial military capacities. However, if an individual prevails through violence, she can seize the target's profits.

I focus on finding strategies that support *peaceful co-existence* over long time horizons: a (subgame perfect) equilibrium where no one prefers to leave, everyone produces and no one prefers to engage in violence to seize others' profits.

2.1 Inter-ethnic complementarities and peaceful coexistence over time

In this simple setup, when violence is cheap and one group is particularly vulnerable, it is possible to show that peaceful coexistence equilibria can *only* be sustained over long time horizons if there is *inter-ethnic complementarity*: different ethnic groups provide complementary services to one another (see Proposition 2 in the Appendix). Further, particularly over long time horizons, peaceful coexistence requires that this complementarity be robust in the sense that it is costly for members of one group to replicate or expropriate the complementary production process of the other.

In contrast, when ethnic groups compete or when the source of inter-ethnic complementarity is easy for one group to expropriate or replicate, incentives for ethnic violence arise and in fact *become accentuated* over long time horizons.

While the Appendix describes the logic more formally, it is useful to sketch the intuition for these results (see also Table 1.) First, let us take the *vulnerable outsiders* case, where non-locals are militarily weak but have better outside options. To show the importance of complementarity,

[8] A classic example of two complementary goods: cookies and milk.

Table 1: **Community-Level Incentives for Peace over Long-Time Horizons**

Community-Level Incentives over Long-Time Horizons	***Non-Local* Ethnic Groups Vulnerable**	***Local* Ethnic Groups Vulnerable**
Non-Robust Inter-Ethnic Complementarities	**No Peaceful Coexistence Eqm:** Incentives for violence (even ethnic cleansing) to induce exit, reduce political/economic competition	**No Peaceful Coexistence Eqm:** Incentives for violence (even genocide) to reduce political/ economic competition
Examples:	*Muslims in Gujarati non-port cities 2002, Jews in Spain 15C*	*Native Americans in the US 17-18C, Fmr Yugoslavia 1990s*
Robust Inter-Ethnic Complementarities (non-expropriable, non-replicable)	**Peaceful Coexistence Eqm Exists**: vulnerable groups' prosperity depends on their ability to leave (IC_L binds). Long-term incentives to invest in *reinforcing institutions* to build trust.	**Peaceful Coexistence Eqm Exists:** vulnerable groups' prosperity depends on ability to withhold production (IC_P binds). This rises with monitoring costs. Long-term incentives for (*non-expropriable) human capital investments that weaken monitoring* .
Examples:	*Muslims in Indian medieval ports; Jews in the Ottoman Empire (15-20C)*	*Cochineal growing indigenous communities in colonial Mexico (16C-19C); Indian opium traders (19-20C)*

let us consider the alternative case where members of different ethnic groups provide substitute goods or services that *compete* with each other. Then, over long time horizons, a "strong" local (for whom violence is cheap) will have an incentive to target non-locals with ethnic violence. Violence against non-locals not only allows a strong local to seize their property but also to induce non-locals to leave and reduce future competition. In fact, weak non-local competitors are more attractive targets of violence than weak local competitors, as locals have worse outside options: it is harder to use violence to induce them to leave. Thus, societies where locals and non-local ethnic groups compete are likely to exhibit not just violence, but specifically greater *ethnic* violence. Ironically, longer time horizons, which can emerge with *greater political stability*, can actually lead to *greater incentives for ethnic cleansing.*

In contrast, when ethnic groups provide complementary goods or services to one another, the incentive to attack non-locals diminishes over long time horizons. As long as it is credible that non-locals leave as a response to violence, locals will face a future of reduced supply of goods and services that only non-locals provide. This future stream of gains from trade has the potential to deter violence as long as the source of complementarity must itself by *robust* in two specific ways. If non-locals provide valuable services to locals then, over long time horizons, members of the local group will have incentives to replicate their production processes, or simply to

violently seize the means of producing that complementary good. Thus it becomes important for peaceful co-existence over time that the sources of ethnic complementarity be costly to replicate or expropriate. Expropriable sources of complementarity such as land, machines or other forms of physical capital, that can be seized through violence, or low skill types of human capital that can be easily replicated, are unlikely to serve as a robust source of complementarity over time.

On the other hand,*trading networks* are intangible, thus impossible to expropriate, and enjoy *network externalities* that increase their value as they grow, making them hard to replicate once they are large. Such networks *can be* a robust source of complementarity that can sustain peaceful coexistence over time as long as other external circumstances– such as economic and political conditions, etc., do not change. We now turn to robustness of peaceful coexistence equilibria to such changes, focusing on two in particular: changes in the outside option available to vulnerable groups, and changes in the *discount rate*: the value of the future relative to the present.

2.2 The robustness of peaceful coexistence

As mentioned above, in the vulnerable outsiders case, a key condition for peaceful co-existence, even in the presence of robust inter-ethnic complementarities, is that non-locals can credibly leave in anticipation of, or in response to violence. This option to leave also acts as a lower bound on the prosperity of non-locals: the better the outside options for non-locals, the greater the competition between local communities for non-locals providing complementarity services, and the more non-locals reap the gains from trade. This has two further consequences. First, environments where non-locals provide not only robust complementarity services but also can credibly threaten to leave have enhanced incentives for each community to invest in local *institutions*– organizations or norms– that reinforce inter-ethnic trust and commercial activity, and make them more robust to a changing environment. We will discuss how, in the case of Muslim traders in South Asia, these organizations and norms survive and support inter-ethnic tolerance even two centuries after the erosion of Muslim complementarities in overseas trade that sparked them to begin with.

An extreme case of having lowered outside options comes when locals themselves are vul-

nerable. This *vulnerable indigenous case* has historic parallels among many colonial societies, particularly in Latin America and the New World. Those that compete with stronger non-locals, or have expropriable or replicable complementary resources, are likely to be the targets of violence over time, as by doing so non-locals can expropriate these resources. Further, if locals are hard to displace, incentives for extreme violence, even genocide, may be accentuated (see Table 1).[9]

But what if locals are able to provide robust complementarities? In a repeated game, without the option to leave, the only sanction locals can use to deter expropriative violence is to withhold production. This will work if the military strength of individuals from either group is similar and local profits are low enough to make the cost of violence a deterrent. However, with locals acting as a captive workforce without having an option of leaving, non-locals may also be able to simply force their labour with the threat of violence. This was a common practice in a number of colonial societies and still occurs in some weak states (see, e.g., Dell (2010)).

How then can vulnerable indigenous groups prosper even in such an environment? There needs to be some friction that prevents the coercion of labour. One such friction occurs when the effort that goes into production is hard to monitor– for example, it is hard to tell whether a product was lost to due to natural conditions or due to a voluntary slowdown in effort. It can then be cheaper to incentivize effort through a more equitable share of the gains from trade, rather than coerce effort through violence. We will describe how the presence of these conditions in the production of cochineal in colonial Mexico and opium in India led to the development of groups of indigenous entrepreneurs that could enjoy peaceful coexistence and a modicum of prosperity, even in circumstances that range from the extreme violence of the Spanish Conquest of Mexico to the more institutionalized coercion of the British Raj.

We now turn to other potential threats to peaceful coexistence. One comes from shocks– such as political instability or external threats– that may affect the extent to which that strong ethnic groups value the long-term gains of future trade relative to present temptations for expropriative violence. This threat is accentuated when vulnerable ethnic groups operating

[9] As discussed below, the concepts of ethnic competition and complementarity are not confined to economic endowments but can include contests over political rights and control over policies. These can also generate incentives for ethnic cleansing, as arguably occurred in the former states of Yugoslavia in the 1990s. See also Jha (2014) and Posner (2004).

in thin markets. Returning to the *vulnerable outsiders* case: even in the presence of robust complementarities, if there is limited competition *between* a relatively small set of non-locals, this is likely to result in non-locals acting as *monopsonists*– extracting most of the gains from trade with locals. Even small falls in the relative value that a local puts on the future versus the present, such as due to external threats, can lead locals to engage in expropriative violence even at the risk of losing future trade.[10] Thus, the presence or creation of non-violent mechanisms to share the gains from trade between groups can make long-term peaceful coexistence more robust to changes in the discount rate.

We will provide two examples. First, we will discuss how the coordination of access to trade around religious pilgrimages made it relatively easy to become a trader in the Islamic Middle East and how the resulting competition among Muslim traders reinforced peaceful relations with local communities in the Indian Ocean. We will contrast this with other trading minorities, such as Chinese trading communities in Indonesia, and South Asians in East Africa, where networks were ethnically based, and thus hard to enter for those not already in these groups. In contrast, those immigration policies that favor thick markets with high degrees of between-group complementarity accompanied by *within-group* competition, should make tolerance between ethnic groups more robust.

Second, we will examine artificial non-violent sharing mechanisms that can serve the same purpose. A common example of these is the provision by non-local vulnerable minorities of *protection money* to strong locals. This can lead to perverse incentives, in what I call an *ethnic cronyism equilibrium*, in which a strong local encourages violence in order to demonstrate the value of protection and extract more protection money. In fact, intermittent violence can occur in equilibrium whenever the strong local is not sure whether a low amount of protection money he has received is coming from bad times over which non-locals have no control or from the incentives non-locals face in trying to skimp. We will contrast ethnic cronyism to other policies that exploit financial innovations to share the gains from peace and trade, and discuss how they can re-ify or mitigate ethnic tensions over time.

[10] Idi Amin's wholesale expulsion of close to 80,000 South Asians from Uganda in 1972, while facing invasion from Tanzania, arguably fits this case. This move, which occurred in the wake of anti-South Asian riots, ultimately proved very costly for Uganda's commercial sector and its economy more generally.

3 Broader empirical patterns

Below, we will provide specific examples that illustrate the theory. But it is first useful to ask: how much do these arguments fit general empirical patterns? To answer this, Jeon (2014), building on an earlier version of this paper, operationalizes a measure of inter-ethnic complementarities at a global scale. He codes the land use patterns of the homelands of ethnic groups around the world– focusing on the major division between animal husbandry and agriculture. He then uses spatial cluster analysis to classify grid cells into those in which groups were engaged in similar economic activities– indicative of ethnic competition– or whether they were strongly specialized in different activities, indicative of inter-ethnic complementarities. Jeon correlates these spatial patterns with measures of local conflict from sub-Saharan Africa between 1997-2012 from the Armed Conflict Location and Event Data project (ACLED). He finds that ethnic groups that are highly differentiated from those in their spatial clusters– e.g. pastoralists in a region of agriculturalists and vice versa– are much less likely to experience conflict in this period. Relative to otherwise similar ethnic groups engaged in competitive activities, agricultural minorities in areas that complement local pastoral communities experience 70% fewer fatalities from armed conflict, 35% fewer riots and protests and 90% fewer fatalities from violence against civilians. For pastoralist minorities in agricultural regions, these numbers are 90% fewer battle fatalities, 50% fewer riots and protests, 80% fewer fatalities from violence against civilians (Jeon, 2014)[chp 3,pg.14]. The relevance of trade opportunities is also underlined by Berman and Couttenier (2015), who also use the ACLED data from Africa, and find that there is a negative correlation between the probability of violence in any year and the international export value of commodities that are produced nearby. However, this negative correlation between commodity values and violence is weakened in locations that are geographically more remote from seaports, suggesting that local trade conditions play an important role in mitigating conflict.

While these broader patterns provide a useful validation of the basic relevance of the theory to contemporary settings, in order to examine long-term patterns that support peaceful coexistence, and to shed light on the mechanisms, it is necessary to take a deeper historical perspective. We will begin by illustrating the two basic cases: of *vulnerable outsiders* and

vulnerable indigenous.

4 Example: Vulnerable Outsiders and Ethnic Tolerance in South Asia

On 25th September 1990, the leader of India's Bharatiya Janata Party (BJP), L.K. Advani, climbed aboard a DCM Toyota pickup truck, decorated to look like a chariot. He charted out a 10,000 km route beginning at the coastal town of Somnath to the city of Ayodhya, its path aimed at raising awareness and support for plans by BJP activists to demolish a mosque that some believed had been built over the birthplace of the Hindu deity Ram. Advani's *Rath Yatra*, or 'chariot journey', and the subsequent demolition of the mosque was swiftly followed by a wave of some of the worst religious violence between Hindus and Muslims that India had seen since its Partition.

The choice of the city of Somnath as the inception point of the procession was also no accident. It hearkened back to the year 1026, when Mahmud of Ghazni had led his cavalry down from the mountains of Afghanistan to the city of Somnath. Mahmud had sacked the city and destroyed its temple, killing an untold number of the city's inhabitants. To Mahmud's chronicler, Alberuni (1030) who accompanied the raid, and ever since, the raid on Somnath has been considered pivotal in polarizing Hindus and Muslims.[11] Its memory is often invoked by nationalist leaders to mobilize individuals politically and to foster ethnic hatreds (Thapar, 2004).

Yet, the legacy of this polarizing event seems to have been offset by other incentives even within Somnath itself. By as early as 1262, evidence exists that the authorities of the rebuilt Somnath temple made a large-scale land grant of *temple lands* to a Muslim trader, Nur-ud-din Firuz of Hormuz, to settle in the adjacent trading port of Veraval, with the inscription making clear that the authorities were explicitly aware of the commercial taxation and prosperity that a

[11] Alberuni writes:"Mahmud utterly ruined the prosperity of the country, and performed there wonderful exploits, by which the Hindus became like atoms of dust scattered in all directions, and like a tale of old in the mouth of the people. Their scattered remains cherish, of course, the most inveterate aversion towards all Muslims. This is the reason, too, why Hindu sciences have retired far away from those parts of the country conquered by us, and fled to places where our hand cannot yet reach, to Kashmir, Benares, and other places. And there the antagonism between them and all foreigners receives more and more nourishment from political and religious sources ... (Alberuni, 1030)[pg.22]"

colony of Muslims could bring (Thapar, 2004)[pg.84-85]. Evidence of other mosque endowments by *Hindu* elites have been found on both of India's coasts. Tolerance towards Muslim traders operating beyond Islam's political frontiers was not unique to India but appears to have been a common feature of oceanic trade extending beyond the Indian Ocean to Indonesia and even China (Chaudhuri, 1995)[pg.44].

In fact, tolerance between Hindus and Muslims persist among erstwhile medieval ports across South Asia today. From the seventh century to the seventeenth century, Muslim traders involved in transoceanic commerce benefited not only from robust inter-ethnic complementarities but also a natural means of redistribution between groups. Table 2 summarizes the conditions, and the outcomes. First, there were Islam-specific advantages to trade across the Indian Ocean. Pilgrimages, particularly to Mecca, coordinated the development of the world's largest textile market during the Hajj (Lombard, 2000). The Hajj was supplemented by pilgrimages to other sites, such as Cairo (Fustat) and Basra, that all fostered regional trade. Muslims had strong preferential access to these pilgrimage routes, and the markets they induced.

Second, Muslim advantages in oceanic trade stemmed from preferred access to trade networks. As we have discussed, a key characteristic of trade networks is that they enjoy increasing returns to scale. The remarkable scale of the Hajj in particular was such that it was prohibitively costly for even a substantial number of Hindus to replicate. Third, Muslims had access to an inherent mechanism of redistribution of the surplus from trade to the local population: increased *intra-Muslim competition* due to the relative ease of entry by any Muslim into Indian Ocean trade. Unlike most kin-based trade networks that have high barriers to entry, entry into Islamic trade networks was relatively cheap for all Muslims. Pilgrimages provided a clear coordination device, so that even non-merchant and newly converted Muslims could enter trade; family or community ties were not necessary to follow established pilgrimage routes, and indeed many pilgrimages were financed through trade (Ibn Battuta, 1355, Lombard, 2000).

By satisfying these three conditions, trading ports in the Indian Ocean were well-favoured to provide geographical loci for peaceful co-existence and trade between Hindus and Muslims. From the 7th century onwards, Muslims, both immigrants to India and indigenous converts, dominated the shipping trade in the Indian Ocean and Muslim trading networks expanded along both coasts (Arasaratnam, 1994, Dasgupta, 2004). Muslim dominance of overseas trade

Table 2: **Basic conditions for trade supporting peaceful co-existence: the example of Hindus and Muslims in South Asia**

Minority Group	**Muslims in overseas ports on India's coasts**	**Muslims on inland trade routes**	**Muslims in medieval patronage centers**
Source of Complementarity?	**Yes:** the Hajj and direct access to Middle East trade networks	**Yes:** access to Islamic trade networks from overseas ports	**No**: Hindus and Muslims economic competitors for patronage
Complementarity Non-Expropriable, Costly to Replicate?	**Yes:** trade networks intangible, the scale of the Hajj hard to replicate	**No:** inland trade routes can be replicated locally by Hindus.	**NA**
Non-Violent Transfer Mechanism?	**Yes:** ease of entry allows within-Muslim competition	**Potentially:** ease of entry allows both inter-ethnic and within-Muslim competition	**No**
Outcome	**Long-term peace,** reinforcing institutions that reduce Hindu-Muslim riots by ~5x relative to similar towns, greater modern inter-ethnic trust (as measured by polio vaccinations), greater ethnic specialization, minority wealth.	**No effect** on subsequent propensity for ethnic riots. Limited incentives for inter-ethnic trade. No long-term incentives to forge institutions.	**Increased propensity for ethnic violence**. ~2x propensity for Hindu-Muslim riots, 1850-1949. Continued economic competition leads to political competition and incentives for ethnic cleansing.

continued for close to a thousand years, ending only when the discovery of new sea routes led to increasing attempts by European powers to monopolize and divert commerce. By the end of the 17th century, the era of Muslim trade dominance in the Indian Ocean was long over, and many medieval trading ports ceased to be commercially important.

Yet, for over a thousand years, inter-group complementarities existed between Hindus and Muslims in medieval trading ports, which, being politically fragmented, often competed with one another to serve as a locus for trade. During this period, higher mutual incentives existed in medieval ports than other towns for residents to invest in complementary *institutions*– in the form of organizations and cultural norms– to maintain the incentives for peaceful co-existence even in the presence of such shocks. Such institutions appear to have persisted in shaping Hindu-Muslim interaction at medieval ports long after the decline of Muslim advantages in trade that initially encouraged them to develop.[12]

Indeed, as Figure 1 suggests, Medieval ports exhibit strikingly lower incidences of religious violence compared to both these classes of other towns, as well as to towns geographically close by. In fact, medieval ports experienced around five times fewer riots on average (Jha, 2013b). The proportion of medieval ports experiencing at least one outbreak of religious violence between 1850 and 1949 was around 10%; close to 40% of other towns faced a riot. The intensity of the riots also appears to be lower: on average, five medieval ports together experienced a single death due to religious violence, but in other towns, religious violence claimed an average of nearly 23 lives *per town*. However, as indicated by municipal income, medieval ports were on average poorer than both harbour towns and other towns. Medieval ports also have a more mixed religious population. These indicators are commonly associated with *higher* rather than lower incidences of ethnic violence.

These differences in patterns of conflict between medieval ports and other towns persist though diminish following the Partition of South Asia, in part reflecting the extensive ethnic cleansing of minority populations in previously riot-prone non-medieval port towns. These differences diminish still further with a series of economic and political shocks near the end of the 1970s. However, medieval trading ports continued to experience fewer riots and exhibited

[12]The role of complementary investments in generating path dependence is explored in Milgrom, Qian, and Roberts (1991). Greif and Laitin (2004) provide a general theory of institutional persistence.

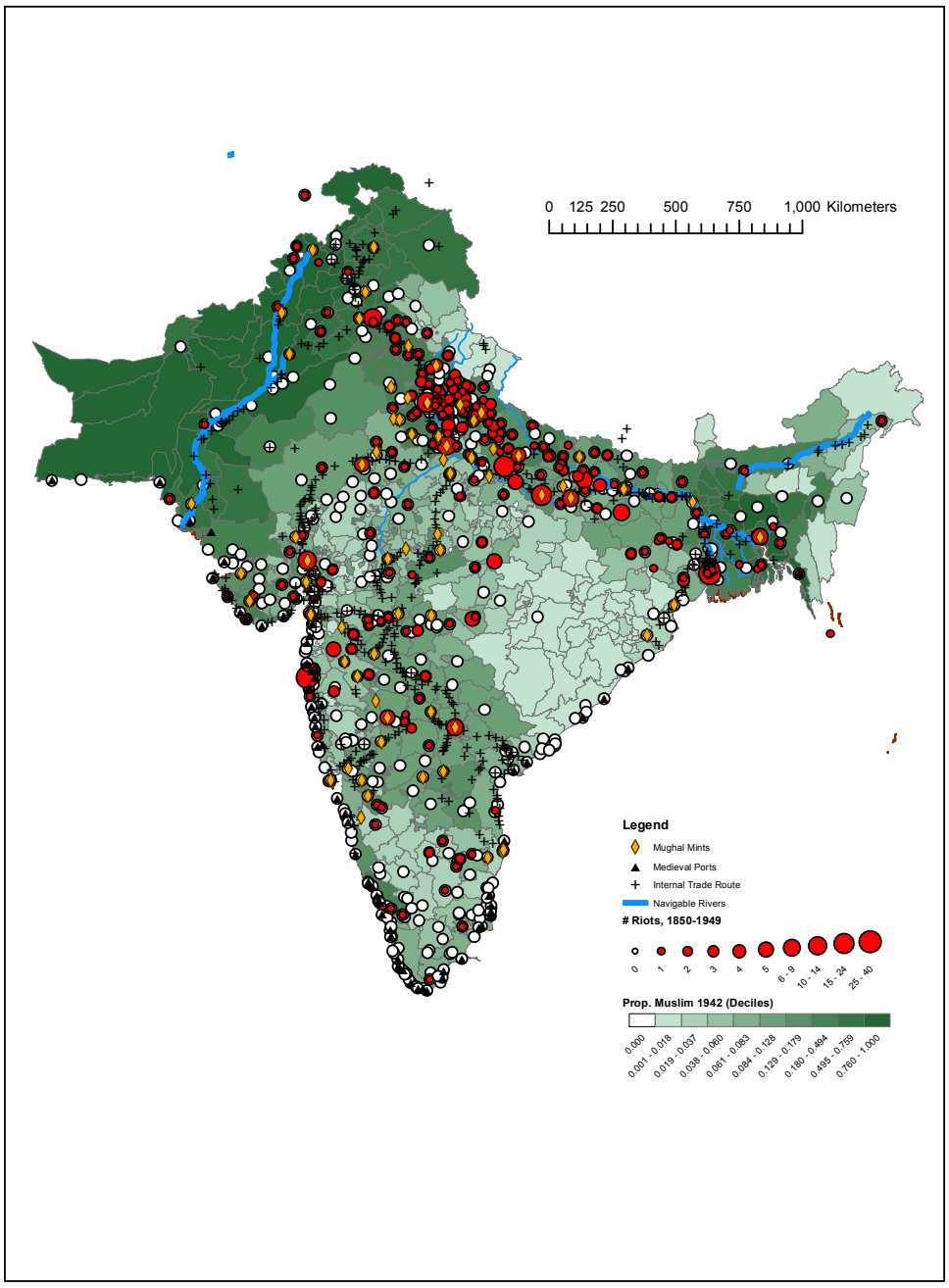

Figure 1: **Hindu-Muslim Riots in Indian towns, 1850-1949**

Muslims traded to ports across both coasts in the medieval period. Many towns were also founded as centres of Muslim political control and patronage in the medieval period, with mints established to monetize wealth. Even two centuries after colonial intervention disrupted Muslim dominance in overseas trade, there were fewer riots in medieval ports than towns close by. Meanwhile, centers of patronage, despite being historically wealthy, also tended to be more riot-prone subsequently.

less widespread religious rioting in the aftermath of the destruction of the Babri Mosque in 1991 and during widespread rioting that afflicted the state of Gujarat in 2002 (Jha, 2014).

So why did these differences persist, even after the Hajj ceased to be as important for trade? As mentioned above, the answer appears to lie in the development of organizations and norms in medieval ports that have proved to be long-lasting. Medieval-era institutions appear to have fulfilled two distinct, but complementary roles. One set of institutions encouraged group specialisation and raised the costs of replicating the services provided by another ethnic group. Specialisation in skilled activities was encouraged through a system of apprenticeships that were often exclusively limited to members of the same ethnic group (Haynes, 1991). Own-group social sanctions also emerged that raised the costs of replicating another group's activities. A prominent example of this was the norm of *Kaala-paani* ("black water"): that Hindus that sailed offshore would be outcaste by their own community.

A second set of institutions helped reduce the incentives for violence, whether by coordinating responses to crises or by sharing the gains from exchange. In Gujarat and Malabar, merchant guilds and inter-religious organisations helped organise both boycotts and joint petitions to political figures to seek redress when members of one religious group were threatened by strong individuals (al Malibari, 1528, di Verthema, 1503). Organisations also emerged to encourage repeated interactions between members of different religious groups. This encouraged trust and the formation of joint ventures (Dasgupta, 1994).[13]

A number of these institutional mechanisms have persisted and evolved through the 19th and 20th centuries. Not only do many of the organizations founded in the medieval period still exist to this day, household survey evidence from medieval ports in 2005 continues to show patterns of lowered perceived community conflict, reduced inter-ethnic inequality, complementary occupational specialization and more wide-spread inter-ethnic organizational membership in 2005 relative to their counterparts in other urban areas (Jha, 2013b).

What happens if one of the three conditions is not present? It is useful to compare the

[13]Muslim traders around India provided commercial taxes and explicitly endowed local public goods, including water projects and even Hindu temples (Risley, Meyer, Burn, and Cotton, 1909, Bayly, 1989). Relative to other areas, conversion to Islam and immigration from the Middle East was encouraged by local populations in Malabar ports (al Malibari, 1528), reducing costs of entry into trade and further increasing within-Muslim competition. The sharing of the gains from trade, whether through increased intra-group competition, explicit inter-group transfers or joint ventures between groups are likely to have provided Hindus and Muslims in medieval ports reduced incentives for inter-ethnic violence in times of crisis.

complementarity Muslims enjoyed over oceanic trade networks that were hard to replicate or expropriate to the potential for enhanced tolerance among those that lived along land-based or riverine trade routes. Notice that, unlike oceanic trade, most long distance land-based trade can be divided into relays of shorter distances, each of which can be replicated by a member of the local group. Indeed as Table 2 summarizes and Figure 1 suggests, unlike medieval ports, towns on historic inland trade routes fail to show reductions in Hindu-Muslim violence.

Further, if instead of complementarity, there is a history of ethnic competition, as we have discussed, the incentives for ethnic violence are accentuated, and the incentives to develop institutions to support inter-ethnic trust are lower. Many cities were founded by Muslims in India to be centers for patronage in which Hindus competed with Muslims. These towns experienced twice as many Hindu-Muslim riots between 1850 and 1949 as similar towns (Jha, 2013b). The propensity for ethnic riots in these towns was particularly accentuated when they intersected with political competition (Jha, 2014).

5 Example: Vulnerable Indigenous and Entrepreneurship in Mexico and India

Beyond robust complementarities, a key condition to deter violence and support the growth of community-level institutions to support inter-ethnic tolerance was whether vulnerable groups could credibly threaten to leave for other venues in the event of violence. But what if the outside options are weak, so traders cannot credibly threaten to leave? As discussed above, peaceful coexistence can instead be supported by the threat that vulnerable groups that provide complementary services withhold that production. The latter requires there to be some friction, such as high monitoring costs, that prevents the militarily powerful from using the threat of violence to simply coerce effort. To illustrate and substantiate this case, I will now discuss evidence that suggests how such complementarities and such a contractual environment existed in the case of the indigenous producers engaged in the cochineal trade in New Spain (Diaz-Cayeros and Jha, 2017), and in the case of opium in Western India, leading to survival in the face of colonial conquest and the development of successful indigenous entrepreneurs. These indigenous entrepreneur groups later also supported the democratization of political power. In

contrast, communities that lacked these conditions fared much more poorly.

The Conquest of Mexico by Hernan Cortes in 1521 was arguably among the most traumatic moments in world history. War and disease led the indigenous population of Mexico to fall from an estimated 15-30 million in 1518 to 2 million by 1600 (Acuna-Soto, Stahle, Therrell, Griffin, and Cleaveland, 2004). In Diaz-Cayeros and Jha (2017), we examine the survival of different indigenous communities in this critical moment, in order to understand how, even in this moment of great vulnerability, which communities could survive, and even thrive. We look, in particular, at the long term effects on indigenous populations of cultivating one of the world's most valuable traded commodities up until the early 19th century: the *Spanish Red* dye extracted from the cochineal insect. From the sixteenth century to the independence of Mexico in 1821, cochineal was the most valuable processed good exported to Spain from the Indies, second in value only to silver and gold. Indigenously domesticated in New Spain, cochineal was incredibly fragile, and tended to die with sudden changes in weather, temperature or precipitation beyond its ideal range.

This had two implications. First, it required both local know-how and high powered incentives to cultivate: when the Spanish tried to cultivate cochineal on plantations, as in the Yucatan, they found that the crop would be destroyed, with the indigenous communities blaming the weather. Ultimately, the Spanish left the crop to be cultivated by indigenous peasant producers, particularly women. Second, its extreme fragility meant that, unlike with Brazilian rubber, Indian indigo and Chinese silkworms, attempts by spies from Britain and France to steal cochineal and transplant it overseas failed, and cochineal remained a lucrative New Spanish monopoly for three centuries.[14]

In Diaz-Cayeros and Jha (2017), we exploit the discontinuous fragility of cochineal with respect to micro-climatic differences during the growing season to identify the long-term effects of cochineal production among municipios that housed indigenous populations in the pre-Columbian period. Despite the fact that the microclimates favoring cochineal are actually bad for other staple crops, and despite the fact that synthetic dyes largely killed the cochineal industry as early as the 1880s, we find that municipios that produced cochineal had a lower share of

[14]Following independence from Spain in 1821, Mexico lost its monopoly on cochineal, and falling demand due to changing European fashion tastes and the development of synthetic dyes in late 1880s led to the end of the industry.

their populations in extreme poverty in 2010 by 5 percentage points, a large effect comparable to the 10-year improvement due to Mexico's successful Progresa/ Oportunidades conditional cash-transfer policy. The gains accrue disproportionately to indigenous households and women, who were among its major cultivators. We contrast these long-term gains of erstwhile cochineal producers with the negative patterns in pre-Columbian municipios that produced expropriable goods, such as gold or silver, and an indigenously developed but replicable good– cacao.

We trace these differences between cochineal and non-cochineal producing communities back to the moment of the traumatic Spanish Conquest itself, exploiting novel hand-collected pre-Conquest and Conquest-era data, including from the *Matricula de Tributos* (ca 1521) and the *Suma de Visitas* (ca 1548). We show that among municipios that contained pre-Columbian communities, those that produced cochineal dye were 7 percentage points more likely to house surviving Indian pueblos and to sustain 61% higher populations in 1790.

Though cochineal producers enjoyed robust complementarities with the Spanish, the incentives to invest in institutions to support commerce were quite different from the vulnerable outsiders case. Instead of Spaniards and indigenous seeking to build trust, the Spaniards built roads to improve the monitoring of cochineal producers, while cochineal producers faced incentives instead to increase their ability to avoid monitoring, disintermediate the Spanish officials who sought to control the cochineal trade, and to trade directly with alternative Spanish buyers in the open market. Historical accounts point to ethnic assimilation by cochineal producers, who adopted Spanish language and fashions. Indeed, cochineal producing municipios continue to show greater evidence of ethnic assimilation were more unequal in 2010, and, in the state of Oaxaca, were less likely to adopt indigenous governance institutions. Within Oaxaca, they also show greater concentrations of private sector firms, and greater valued added by them. These economic differences are paralleled with political differences. Cochineal-producing municipios were less likely to engage in clientelistic political relationships, housing fewer core supporters for the hegemonic party, the PRI, between 1970- 1988. They were also more likely to turnout and vote against the PRI in the critical transitional election of 2000 that instituted democracy.

The fragility of cochineal provided the possibility of large-scale gains from world trade to the communities of New Spain, with the ability to verify and enforce contracts shaping whether the indigenous or the Spaniards were the key beneficiaries from exposure to the world market.

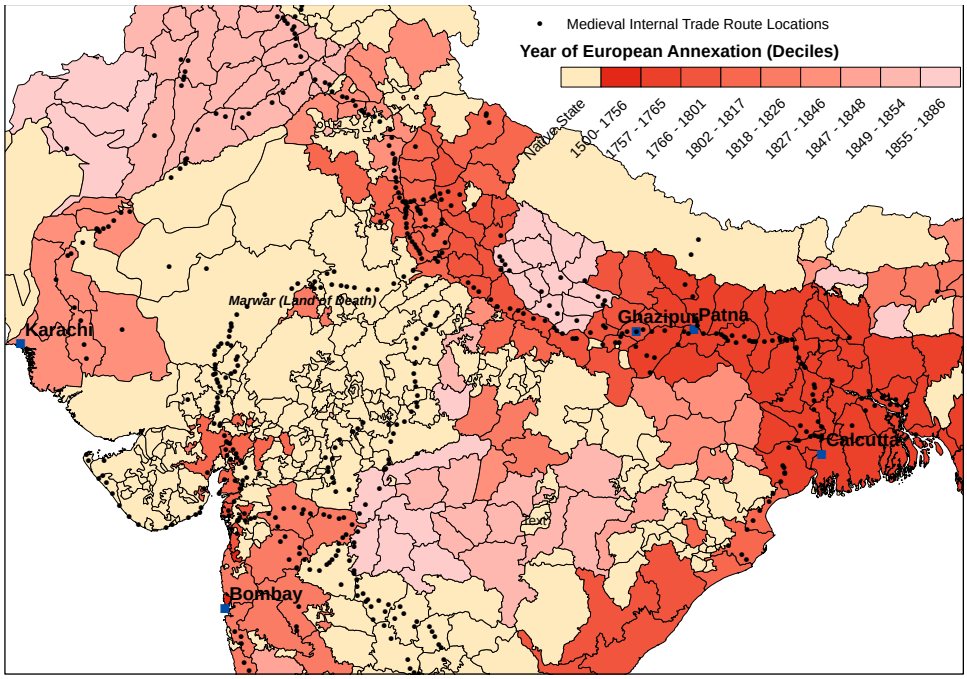

Figure 2: **Opium production and trade routes in Native States and British India**
The entire east coast of India was under British control, with opium production centralized and monitored in Ghazipur and Patna. The west coast, however, contained ports in both Native States and Portuguese territories that enabled smuggling. Indigenous trading communities were enriched along old trading routes, such as in Marwar.

This is not, however, just a New Spanish story. In South Asia, too, a product in high demand overseas– opium– seems to have had differential effects on communities depending on the ability of the British to enforce contracts and extract the gains from trade. Due to Chinese demand, opium was a highly lucrative Indian export, representing 31% of India's export revenues in the 1850s, and its peak in the 1870s was worth an average of Rs. 119,489,000 a year (Richards, 2002).

In areas where the territory and ports– particularly Calcutta– were under the direct control of the Company, such as Bihar and the Eastern United Provinces, the East India Company experimented with a number of different contracting arrangements, including contract-forwarding, before settling upon a system based upon monitoring and monopoly production in two factories, located at Patna and Ghazipur (Kranton and Swamy, 2008) (see Figure **??**. The East India Company, its successor, the Raj, and their intermediaries were the main beneficiaries, and conditions for local producers were poor and coercive.

But, the Raj was only able to monopolize production and supply in the East of the country. In Central and Western India, Indians in ninety Native States were able to produce, and smuggle, opium beyond the borders of British control to Karachi (in then independent Sind) and to Portuguese Daman. These monitoring costs changed the nature of the business in the West in favor of indigenous producers. To channel the opium trade through its own ports, the British sold a discounted "pass" that permitted native opium to be exported through Bombay. Indeed, the opium trade appears to have played a key role in the primitive capital accumulation of two Indian emergent trading communities, the Marwaris (of Marwar and Shekhawati, on the opium trade route to Sind), and the Parsis. Bombay emerged as a commercial center, based in large part on indigenous capital that had its genesis in opium (Farooqui, 2005).

6 Extensions 1: non-violent transfers and Jews in Europe

The case of the Jewish diaspora in Europe provides not only a complement to the vulnerable outsiders case, but also a useful example for illustrating how non-violent transfers can both support peaceful coexistence but also generate perverse incentives that can lead to violence. As Maristella Botticini and Zvi Eckstein (2012) describe, the destruction of the Temple in

Table 3: **An alternative case: the example of Sephardic Jews in Europe**

Minority Group	**Sephardi Jews in Ottoman Salonica (1492-1914)**	**Jews in Sepharad (Spain), pre-1391**	**Jews and `New Christians' in Spain, from 1391**
Source of Complementarity?	**Yes:** access to `New Christian' and Jewish trade networks linking Ottoman empire to Italy and Atlantic economy	**Yes:** human capital (including literacy), make Jews valued as administrators and protected by the Crown	**No**: `New Christian' conversos compete with the remaining Jews and with other Christians
Complementarity Non-Expropriable, Costly to Replicate?	**Yes:** trade networks intangible, direct access to Western Europe costly for Muslims	**No:**human capital potentially replicable over time.	**NA**
Non-Violent Transfer Mechanism?	**Yes:** Large scale migration: 60,000 immigrants from Spain fosters intra- Jewish competition.	**No:** public goods problem makes non-violent transfers underprovided. Protection money paid to regime	**No**
Outcome	**Long-term peace, with Salonica considered the "Mother City of Israel",** ethnic specialization in international commerce, prosperity prior to increased Western European competition.	**Ethnic cronyism equilibrium:** minorities economically prosperous but dependent on protection from regime. Intermittent pogroms demonstrate value of protection. Political instability due to death of Juan 1 while his son still a child in 1390 leads to wave of Jewish pogroms, forced mass conversions.	**Ethnic cleansing:** expulsion of Jews in 1492, Spanish Inquisition seeks to root out lingering Jewish cultural practice among conversos.

Jerusalem by the Emperor Vespasian, and his protege Titus, in AD 70, had led to a change in Jewish doctrine away from ritual sacrifice towards discussion and analysis of sacred texts. In particular, a norm emerged among the Diaspora where males were required to learn to read the Torah and to receive primary education at a synagogue in order to do so. As a result, Jews also had a long history of greater literacy than most other European populations. This human capital also yielded many Jews an advantage in entering professions that benefited from recordkeeping, such as administration and finance, many of which were complementary both to the local economies of European cities as well as to the capacity of local rulers to govern.

Table 3 summarizes how different epochs of Jewish history fit the conditions of our framework. After the fall of the Temple, Jewish communities spread out across much of the Roman Empire. Recorded Jewish history in *Sepharad*, or the Iberian peninsula, for example, dates back at least to the third century CE (Encyclopedia Judaica, pg 67). In the medieval era throughout the Diaspora, and despite very diverse local cultures and institutions, including under both Muslim and Christian rule, "the place of Jews in society was determined by a remarkably similar constellation of circumstances" that Benbassa and Rodrigue (2000)[pg xxvi-xxvii] call the "royal alliance." This arrangement closely mimics the 'ethnic cronyism equilibrium' discussed above. In that equilibrium, recall that the non-local minority will provide protection money transfers to the strongest locals– for whom the incentive constraint not to engage in expropriative violence binds first. These agents with the greatest capacity for violence– usually local rulers or mob bosses– can in turn credible deter other locals from violence. However, in an environment where this ruler faces some uncertainty about whether the minority paid a relatively low amount of protection money in any period due to bad circumstances, or instead due a choice the made to reduce the protection money, the ruler will face a perverse incentive to intermittently facilitate violence along the equilibrium path, so as to demonstrate the value of protection and to extract more revenue from the minority (Abreu, Pearce, and Stacchetti, 1990).[15]

Indeed, in the 'royal alliance' arrangement, Jews provided financial services, particularly credit, as well as administrative services, such as tax collection, to local rulers, creating a courtier

[15]See Dal Bo and Powell (2009) for a similar logic generating probabilistic violence in a one period perfect Bayesian equilibrium.

class in a number of states, particularly in Spain (Benbassa and Rodrigue, 2000)[pg xxvii]. Pogroms also did intermittently happen, often coinciding with economic downturns induced by poor weather (Anderson, Johnson, and Koyama, 2015). Different ideologies did also have an impact, as was the case when Almoravid invaders from North Africa, sometimes considered fanatics, disrupted the local traditions of Andalusian Spain in 1140 (Menocal, 2002)[pg. 166]. However, it is intriguing how robust this equilibrium often remained. For example, when Christians replaced Muslim rulers in local areas of Spain over the long period of the Reconquista (from ca. 711 onwards), the royal alliance system was maintained, even despite the significant differences in political traditions. In fact, from the Carolingians onwards, Jews played this role among centralizing rulers across much of Europe (Benbassa and Rodrigue, 2000)[xxvii].

Shocks to the relative ability of local rulers and other locals to coordinate and organize violence could, however, disrupt this equilibrium. In Spain, a key moment occurred in 1390, when King Juan 1 died without an adult heir, creating a power vacuum and political instability in Spain. Ethnic riots targeting Jews began in Seville on June 4, 1391, and spread rapidly throughout the Peninsula, killing thousands in Toledo, Cordoba and Barcelona, among other cities (Benbassa and Rodrigue, 2000)[pg xxxiii].[16]

Being impossible to violently expropriate, specialised skills do provide a better basis for inter-ethnic complementarity and tolerance, but even these can be replicated in the longer term. Minorities that have specialised skills can become increasingly attractive targets of violence if locals become able to duplicate those skills. The forced expulsion of Jews from Spain at the end of the 15th century was precipitated in part by the prior conversions, both forced and voluntary, of Jews to Christianity following the 1391 riots, that as Benbassa and Rodrigue (2000)[xxxvii] argue, made the Jews that remained easier to replace economically.

As mentioned above, in contrast to physical and human capital, most ethnic trading networks are both difficult to steal– being intangible– and extremely costly to replicate once they have attained sufficient size. Like Muslim traders in medieval Indian ports, Sephardic Jews benefited from valuable trading networks in the 15th and 16th centuries that rendered them

[16] Similarly, elsewhere in Europe, local rulers who sought to sell protection to the Jewish minority, like the archbishops of Mainz and Trier (Elukin, 2009)[pg.77], and even Crusading knights like Tancred during the initial capture of Jerusalem in 1099 (Montefiore, 2011), could find themselves overwhelmed by these mobilized groups during waves of pogroms.

welcome arrivals in Ottoman ports in the Mediterranean. With links to Spain and the Atlantic economy, their immigration was actively encouraged by local Ottoman authorities and the city of Salonica in particular attracted a large number of Jewish refugees. A combination of permissive immigration and religious specialisation resulted in a long history of peaceful ethnic co-existence (Benbassa and Rodrigue, 2000).[17] For the next four centuries, Salonica maintained a remarkable degree of cultural tolerance and prosperity, with Jews specialised in overseas trade. On the eve of the Great War,in 1913, the population of Salonica was home to 61,439 Jews, the greatest number in Europe (Mazower, 2005)[p.284].[18]

7 Extensions 2: Waves of pogroms and contagious tolerance

As we discussed in the conceptual framework, small changes in the outside option can have dramatic effects on the extent of ethnic tolerance in a society, depending on whether groups provide complements or substitutes, and can lead to waves of ethnic violence or a contagion in ethnic tolerance. To see this, suppose there are two cities or countries. One can think of the other city or country as the "next best option" for a non-local to migrate to, with some transportation cost between them (the modern European Union provides a focal example for residents of nearby countries, as did the United States for European immigrants before 1914).

In our example, if transportation costs to the US fall, or the US lowers its immigration barriers, then non-locals who compete with locals become easier to induce to leave through violence. This can lead to a wave of pogroms, as locals take advantage of this window of

[17] A less attractive aspect of ethnic specialisation in the Ottoman empire was that it was strictly enforced by the state.

[18] Similar patterns consistent with our theory can be found in the experience of Jews in Germany and Eastern Europe. For example, Jedwab, Johnson, and Koyama (2016) find that Jewish communities in Germany that provided complementary services to local communities were also less likely to experience pogroms in the wake of the Black Death (1348-1353). Becker and Pascali (2016) find that Protestant areas in Germany, where usury laws were relaxed during the Reformation in the 16th century and thus Protestants could compete with Jews in finance, saw increases in ethnic violence against Jews following these reforms. In contrast, Catholic areas, where usury proscriptions were maintained, and thus Jews retained complementarity in financial services, saw less ethnic violence. Furthermore, Grosfeld and Zhuravskaya (2017) look at ethnic violence against Jews in the Pale of Settlement between 1800 and 1927.[19] They find that political instability raised ethnic violence against Jews in the Pale of Settlement, where they provided complementary services, while crop failures and other short-term economic shocks that were not accompanied by political instability did not have these effects. Similarly, Voigtländer and Voth (2012) find that in Hanseatic towns, where Jews arguably enjoyed complementary relationships through trade networks, there is no evidence of a persistent culture of anti-Semitism during the Nazi period, particularly when compared to other towns that experienced anti-Jewish pogroms during the First Crusade.

opportunity to reduce future competition. In contrast, in communities where non-local groups provide complementary services, the increase in the credibility of a threat to leave enables them to earn higher profits without fear of being expropriated, and increases the incentives for locals to invest in institutions, such as trust-building institutions, that support trust.

Though these predictions require further substantiation, some evidence exists for these implications of the theory. The emergence of the Atlantic economy, for example, coincided not just with tolerance for Jews in the Ottoman Empire, but with a wave of tolerance for the Jews in Northern Europe, first in the Dutch Republic in the late 15th century, and then in post-Civil War England as it sort to establish itself as an Atlantic power.[20]

Beyond immigration opportunities, the creation of ethnic homelands due to Partition can also change mobility and create a belief among locals that non-locals will leave, raising incentives for violence. Jha and Wilkinson (2012) find that in South Asian districts where local groups gained enhanced organizational skills and were better able to threaten violence due having been assigned to combat in World War 2, there was greater ethnic cleansing of competitor minorities. However, this pattern was reversed in erstwhile medieval ports, where the groups were complements. It would similarly be useful to examine the extent of ethnic competition and complementarity between ethnic groups in Syria and other nations undergoing conflict, to gauge potential unintended effects on patterns of violence of policies that restrict or allow immigration.

8 Extensions 3: Modern approaches to sharing gains from peace and commerce

As we discussed above, non-violent means of transfers, depending on how they are implemented, can either exacerbate or mitigate ethnic violence. Modern approaches to sharing the gains from trade focus mainly on shared *financial* ownership. These can take a number of forms. First, ethnic cronyism remains fairly common in the absence of benign policies. For example, Fisman (2001) documents the relationship between the stock prices of politically-connected

[20] On the other hand, reductions in the costs of immigration to the United States, and improved labor market conditions there appear to have coincided with violence against Jews in Tsarist Russia (Boustan, 2007), which may be consistent with attempts to induce economic competitors to leave.

firms in Suharto's Indonesia, many of them ethnic Chinese-owned, and Suharto's health. Indeed, Suharto's downfall in May 1998 was accompanied by a spate of anti-Chinese riots.

A different approach was taken in neighbouring Malaysia, where two months of riots targeted the relatively urban and commercially oriented Chinese community following the contested 1969 elections. The government then instituted a New Economic Policy in which 30 percent of shares in non-ethnic Malay firms were acquired by state enterprises to be held in trust and then redistributed to the local *bumiputra* population. Similarly, in post-apartheid South Africa, Black Economic Empowerment (BEE) policies have provided strong incentives for firms to have at least 20 percent share ownership by Black South Africans. These ethnic shareholding policies arguably do mitigate the incentives for conflict. However, they are not without other concerns. While the Malaysian trusts appear to have been somewhat successful at redistribution to a broad set of society, critics of the South African policies point to the concentration of such ownership among a relatively small segment of the Black population. Further, by being ethnically-delimited taxes, they reinforce legal ethnic distinctions, which can reify ethnic tensions (Jha, 2013a).

A related but distinct approach was, however, taken by Japanese reformers in the Meiji period (Jha, Mitchener, and Takashima, in progress). In response to the threat posed by a samurai caste, in 1876, the government removed all their privileges, including a monopoly over the right to bear arms. At the same time, however, they commuted their traditional rice stipends into government bonds, and allowed those owning these bonds to be able to start national banks. 310,971 ex-samurai received public bonds worth ¥ 113 million. The number of banks rose from 7 to 150 in two years, of which 80% of each were funded by samurai bonds, and 20% by gold and silver provided by merchants. These banks resulted in long-lived cross-ethnic institutions which, even while eroding the legal distinctions between samurai and non-samurai, appear to have given the former samurai a credible stake in the gains from commerce rather than violence. Through shared ownership in banks, the samurai would play important roles in funding, rather than violently resisting, Japanese economic development (Jha, Mitchener, and Takashima, in progress).

Beyond providing direct stakes in the shared gains from peace and inter-ethnic commerce, certain types of exposure to financial markets can also make individuals more aware of the costs

and benefits of conflict to the broader economy. In a recent randomized control trial inspired by the Meiji case, Jha and Shayo (2016) assigned likely Jewish voters ahead of the 2015 elections to a simplified trading platform in which they could trade financial assets that tracked the value of firms in both Israel and the Palestinian Authority. They find that those exposed to this opportunity to learn through trading in the financial markets were significantly more likely than those assigned to a control group to support the peace process and were also 4-5pp more likely to choose to vote for those parties favouring a restart to peace negotiations. The effects lasted even a year after the subjects were divested of their assets. They show evidence that these results reflect subjects' increased perception of the potential economy-wide gains from a peace settlement.[21] Thus, financial approaches, if designed well, can play an important role in facilitating non-violent means to share in the gains from commerce and inter-ethnic peace.

9 Conclusion

Competition between locals and immigrant groups for jobs has often been cited as a reason for ethnic tension (Olzak, 1992). The theory above suggests that these tensions are most likely to arise in jobs that are unspecialised and require either few or generally-available skills or inputs, since these are the least costly to enter. Yet, even non-local minorities who do not compete, but enjoy complementarities that stem from tangible assets, such as land, machines or other forms of physical capital, will face violence.

While the trading networks of the Chinese in modern Indonesia and South Asians in modern East Africa also made them valuable to the local population, these groups have also lacked a general mechanism of redistribution. Chinese and South Asian ethnic trading networks, based upon personal and community ties, were closed to competitors, and thus relatively small minority groups were able to capture much of the gains from trade. This appears to have rendered these minorities increasingly attractive targets for ethnic violence and susceptible to expropriation by "strong" locals (Landa, 1994, Chua, 2003). Indeed, "protection" by dictators has been a common feature of the histories of many market-oriented ethnic minorities in both medieval and contemporary developing country settings (Chua, 2003, Benbassa and Rodrigue,

[21] Interestingly, those assigned Israeli stocks responded as strongly to being assigned a portfolio as those that received assets from the Palestinian Authority.

2000). Consistent with the "ethnic cronyism" incentives suggested above, such leaders appear to also intermittently revoke this "protection" to demonstrate its value when minority profits are unobservable: allowing pogroms by weaker locals as means to extract still greater long-term transfers.

One ethnic trading network, however, is remarkable in its relative success at maintaining peaceful and profitable coexistence with local populations in East Africa and elsewhere. The Nizari Ismailis, followers of the Aga Khan, have developed systematic mechanisms of explicit philanthropy that benefit the local population, including the provision of public goods, such as hospitals and schools, as well as organisations that explicitly match Ismailis and locals in joint business ventures (Penrad, 2000). These mechanisms also often include commitments not to engage in corrupt practices that foster "ethnic cronyism". As argued above, such a pattern of transfers reduces the incentive by non-elites to engage in pogroms, as well as reducing the ability of rulers to extract transfers over the long term. Though the Ismaili case is unusual in its level of organisation, it suggests that minority communities, acting on their own initiative, may benefit from organising explicit transfers and public goods provision.

Though the language we have used has been of 'economic' complementarities and competition, this argument is not confined to the economic domain. One can also consider the implications where groups act as complements or substitutes in the production of *political pressure* that drives the distribution of public resources. In countries with majoritarian voting, smaller groups are more likely to have the opportunity to jointly benefit from pooling their 'production'– in this case votes– than larger groups, particularly in the case of two groups approaching parity.[22]

Institutions that have emerged throughout history to support ethnic tolerance can provide useful insights into how policymakers can encourage peaceful co-existence across ethnic lines. To encourage tolerance, methods that have been employed include the encouragement

[22]This general interpretation of inter-ethnic complementarity comports with classic studies, such as that by Posner (2004), who documents that in Zambia where the Chewa and Timbukwa ethnic groups are relatively small, they are political allies, where as in Malawi, where they are large, they are competitors. The fact that different groups can compete in accessing national political spoils while still playing complementary economic roles locally also explains an emerging puzzle: across nations where political spoils are significant, one may find that ethnic violence increases as groups attain 50% of the ethnic composition of a society (eg Montalvo and Reynal-Querol, 2005, Dion, 1997); however within those same nations, violence can still be decreased and growth enhanced locally due to the gains from inter-group trade that can stem from ethnic diversity in the presence of complements (Montalvo and Reynal-Querol, 2016).

of specialisation within groups, the fostering of opportunities for repeated interaction in both economic and non-economic spheres, and the creation of institutionalised mechanisms to allow the sharing of the gains from trade.

A number of these approaches may yield dividends for ethnic tolerance today. If designed to align incentives and encourage learning, rather than to re-ify ethnic distinctions, financial approaches *can* be effective in improving support for peace, thereby opening up further opportunities for exchange. Organisations like BAPAR that match members of different communities with complementary skills in the creation of joint business ventures may also be effective for improving ethnic relations. Immigration policies may also benefit from acknowledging their potential effects on the tolerance or violence experienced by communities in sender nations. The threat of violence faced by vulnerable ethnic groups goes far back in history, but so too do many potential solutions.

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TECHNICAL APPENDIX

Model Setup

Suppose that there are N producers within an economy with one of two labels:($i \in \{$"local (l)","non-local (nl)"$\}$), and period discount rate $\delta \in [0,1]$. We assume that non-locals have better options outside the economy, with the period value of leaving normalised to 0 for locals, and $L > 0$ for non-locals. Each individual also has "armed strength" $s_k \in [0, \bar{s}] \subset \mathbb{R}_+$ that was chosen optimally.[23] For now, we will assume that all members of each group have the same armed strength, that of the vulnerable group is normalized to 0 and the stronger group is $s_k > 0$. Thus, in the *vulnerable outsiders case*, all locals have the same armed strength $s_l > 0$, all non-locals have armed strength 0. Similarly, in the *vulnerable indigenous case*, $s_{nl} > s_l \equiv 0$

Consider a sector of the economy with two goods $j \in \{A, B\}$. These goods may be differentiated, but may also be identical. Without loss of generality, let locals produce good A and non-locals good B. The timing of the game each period is as follows:

1-Exit: Individuals choose to stay or leave the economy, receiving $L > 0$ if non-locals, and 0 if locals.

2-Production: If individuals stay, they produce one unit of good j, receiving payoff $\Pi_j \equiv P_j(N_j, N_{-j}) - C$ where N_j are the number of individuals producing good j and C is the fixed cost of producing. Let $P_j(N_j, N_{-j})$ be decreasing in N_j and observe that $P_j(N_j, N_{-j})$ is decreasing (increasing) in N_{-j} if goods A and B are substitutes (complements). Let us denote Π_k the 'profit' – the payoff from the production choice for individual k (i.e. $\Pi_k = P_k(\cdot) - C$). We also assume for now that $L > C$: this implies that for non-locals, leaving is preferred to staying in an economy but not producing.

3-Violence: Following the choice to produce, each individual k is randomly matched with probability $\mathbb{P}(k, -k)$ to any other player $-k$ who they can choose to target with *violence* to attempt to seize the target's profits from production or choose *peace*. Assume that the probability of a match between any particular pair $(k, -k) \in K \times K \setminus k$ satisfies $\sum_{-k \in K \setminus k} \mathbb{P}(k, -k, N) = 1, \forall k \in K$, is decreasing in the number of agents N in the economy and that N is even, so everyone is matched.

For each potential aggressor-target pair, if both individuals choose peace, then both receive their own production Π_k. If, however, an individual k chooses violence against the other $-k$, the aggressor k can try to seize the other's profits, receiving the following

[23] We can think of s as being the outcome of a period 0 game where agents select the optimal investment in quality of arms, and the expected benefits are as structured below. Each is deciding to invest in arms $s \in [0, \bar{s}] \subset \mathbb{R}^+$. The costs of acquiring better arms $c(\theta, s)$ are lower for certain "stronger" individuals, ranked $\theta \in \{1, 2, 3 \dots N\}$, i.e. $\forall \theta' < \theta$ and $s' > s$, $c(\theta', s') - c(\theta', s) > c(\theta, s') - c(\theta, s)$. Then the optimal investment in quality of arms s will also be non-increasing in θ.

expected period payoff:

$$G = F(s_k - s_{-k})\Pi_{-k}(\cdot) - D \tag{1}$$

where $F : [-\bar{s}, \bar{s}] \mapsto (0, 1)$ is a cumulative density function yielding the probability of an aggressor's victory as an increasing function of the relative armed strength of the aggressor and the target $s_k - s_{-k}$. Regardless of success, if any violence occurs, both individuals incur a loss $D \in \mathbb{R}_{++}$, a parameter that captures the destructiveness of violence.[24]

Definition 1 (strategy)**.** *A strategy is a complete contingent plan for each individual $k \in K^{N^t}$ in period t, mapping from: identities of all players $i^{N^t} \in \{$local, non-local$\}^{N^t}$, the strength of arms of the individual and all potential matches $s_k^{N^t} \in [0, \bar{s}]^{N^t}$, production good of all players, $j^{N^t} \in \{A, B\}^{N^t}$, history of violence of all players with each potential target x, $h_{k,x}^{N\tau} \in (k, x)^{N(N-1)\tau}, \tau \in \{0, t\}$ to: choice to stay or leave $L = \{$stay,leave$\}$ and choice to engage in peace or violence with all potential matches $(peace, violence)^{(N-1)^t}$*

Definition 2. *(peaceful co-existence equilibrium). A peaceful co-existence equilibrium is a subgame perfect Nash equilibrium with the following properties:*

1. *There is at least one member of each identity in the economy. $i^{N^t} \cap K^{N^t} \neq \emptyset, \forall i \in \{$local, nonlocal$\}$*
2. *IC_L: No agent has an incentive to leave. $V_{stay} \geq V_{leave}, \forall k \in K^{N^t}$.*
3. *IC_V: No agent has an incentive to target another with violence. $V_{peace} \geq V_{violence}, \forall (k, x) \in K \times K$*

9.1 Peaceful coexistence in the one shot game

We will look for ethnic population profiles (N_l, N_{nl}) such that a peaceful co-existence equilibrium exists. We work backwards, first considering the incentives for violence, then the incentives to stay or leave.[25] Notice that the temptation for violence will be greatest for the strongest agent targeting the weakest agent, as the expected probability of successful expropriation will be at its highest. Observe that the best response to violence is violence. In the simplest example, this constraint binds first in the subgame where a local is matched with a non-local. Thus all the non-violence constraints reduce to the single constraint below:

$$\mathbf{IC_v} : F(s_{\hat{k}})(\Pi_{nl} + \Pi_l) - D \leq \Pi_{\hat{k}} \tag{2}$$

where $F(s_{\hat{k}})(\Pi_{nl} + \Pi_l) - D$ is the payoff to the strongest agent from violence, and $\Pi_{\hat{k}}$ denotes the value of profits the strongest agent receives from peaceful production, which equals Π_l in

[24] Thus if both choose violence, the profits of both are liable to be expropriated and the payoff for each individual k is: $F(s_k - s_{-k})(\Pi_k + \Pi_{-k}) - D$. Observe that if violence is a dominant strategy for either agent, then the unique Nash equilibrium of the subgame is (violence, violence), as long as there is at least a little uncertainty about which agent prevails in conflict (i.e. $F(s_k - s_{-k}) < 1$).

[25] In the stage game, notice that if an agent stays, they always produce.

the simplest vulnerable outsiders case, and Π_{nl} in the case of the vulnerable indigenous.[26]

Let us focus for now on the *vulnerable outsiders* case, noting that a symmetric argument applies to *vulnerable indigenous*. Substituting and rearranging (3), we get:

$$\mathbf{IC_v} : D \geq F(s_l)\Pi_{nl}(N_{nl}, N_l) - (1 - F(s_l))\Pi_l(N_l, N_{nl}) \tag{4}$$

Notice that the non-violence constraint (IC_v) is relaxed (and thus peace easier to sustain) as the relative armed strength of non-locals gets closer to locals (mutual deterrence), as non-local profits Π_{nl} fall (and thus locals have lowered temptation to expropriate non-locals) and as local profits rise (locals have more to lose from violence).[27] Further, since ethnic groups always compete with themselves, an increase in the non-local population N_{nl} lowers non-local profits.

Now consider the decision by individuals to leave. First, observe that since non-locals gain L over locals from leaving, the binding constraint is the choice for non-locals to stay or leave. Next note that since $\Pi_L(\cdot)$ is monotonic in its arguments, the inverse profit function Π^{-1} exists, and provides a unique N_{nl} for a given N_l. Let us define $\overline{N_{nl}}(N_l)$ as the maximal level of non-local population such that non-local profits have fallen to where non-locals are indifferent between staying and producing and leaving: $\overline{N_{nl}}(N_l) \equiv \Pi^{-1}(L, N_l)$.

Proposition 1. *(Existence in the One-Shot Game.) For a given local population N_l, a peaceful coexistence equilibrium exists for all non-local populations $N_{nl} \leq \overline{N_{nl}}(N_l)$ if and only if:*

$$IC_V : D \geq F(s_l)\Pi_{nl}(1, N-1) - (1 - F(s_l))\Pi_l(N-1, 1) \tag{5}$$

The IC_V condition (5) requires that the cost incurred in violence exceeds the potential value to the strongest potential belligerent (in this case a local) in attempting expropriation. We also need to check one step deviations of other constraints: IC_L: that no one prefers to leave given that IC_V holds and IC_P: that production be weakly profitable, so no one has a profitable deviation to withdraw production. IC_L is guaranteed by definition $\forall N_{nl}(N_l) \leq \overline{N_{nl}}(N_l)$. IC_P is guaranteed by $L > C$ and IC_L.

IC_V can be used to further implicitly define the minimal non-local populations to sustain peace. In particular: the maximum level of non-local profits that makes locals indifferent between expropriative violence and peace defines the minimum non-local population that can

[26] More generally, for an arbitrary distribution of armed strength (see below), we would have:

$$\mathbf{IC_v} : F(s_1 - s_N)(\Pi_1 + \Pi_N) - D \leq \Pi_1 \tag{3}$$

where $F(s_1 - s_N)(\Pi_1 + \Pi_N) - D$ is the payoff to the strongest agent from violence, and Π_1 (Π_N) is the value of profits the strongest (weakest) agent receives from peaceful production.

[27] Note that, in our (symmetric) example, a member of an ethnic group never has an incentive to attack another in the same group along as there is some destructiveness of violence $D > 0$. This is because the expected gain is lower than the returns from peace: $F(s_k)(\Pi_k + \Pi_k) - D = \frac{1}{2} \cdot 2\Pi_k - D < \Pi_k, \forall k \in \{l, nl\}$. D could thus be interpreted either as physical destruction or as a cost due to implicit risk aversion.

be sustained in a peaceful co-existence equilibrium ($\underline{N_{nl}}(N_l)$):

$$\Pi_{nl}(\underline{N_{nl}}, N_l) \equiv \frac{D + (1 - F(s_l))\Pi_l(N_l, \underline{N_{nl}})}{F(s_l)} \tag{6}$$

Observe that if non-locals and locals produce complementary goods, then even in the one shot game, an exogenous increase in the non-local population N_{nl} will both decrease non-local profits Π_{nl} and raise local profits Π_l, relaxing the non-violence constraint. Thus, if non-locals provide complements, inter-ethnic peace is in fact easier to sustain as the size of the non-local minority rises.[28]

In contrast, if locals and non-locals produce substitute goods, then an increase in the non-local population will have an ambiguous effect: on one hand, non-local profits will fall, making the non-local group less attractive targets of violence; on the other, local profits will also fall, reducing the potential downside to engaging violence faced by the local population. The direction of the effect will depend on the realisation of F and the change in the profit functions Π_l and Π_{nl}. If we assume, plausibly, that the own price response (i.e. the effect of non-local population size increases on non-local profits) is greater than the cross-price response (i.e. that on local profits), and given $F(\cdot) \in (\frac{1}{2}, 1)$, the effect will be to relax the IC_V constraint, and make peace more easy to sustain. Thus, *thick markets* can mitigate incentives for conflict, whether individuals produce either complements or substitutes, by reducing the gains from expropriating vulnerable groups. It is in smaller sectors and niche areas where the gains from violence may be accentuated.

A further intriguing element is that non-local minorities have mixed feelings about each other's company. With the same endowed production technology and providing substitute goods to one another, non-locals reduce one anothers' profits. However it is also in their interest to have others from the group around: if the group size falls below the threshold $\underline{N_{nl}}$, then non-local profits will rise to a level where there will be an incentive by locals to engage in expropriative violence.[29]

In fact, the $\underline{N_{nl}}$ threshold non-local population size would also be the minority size preferred by the non-local minority group as a whole.[30] In contrast, local producers would have different preferences for non-local immigration, depending on whether non-locals provide complements (in which case, local producers prefer the maximum incentive compatible non-local

[28]Notice that from (6), we can also characterise the *maximum inter-ethnic inequality*. As non-locals become relatively weaker,(as $F(s_l)$ approaches 1), then the maximum inequality in ethnic profits that can be sustained peacefully ($\Pi_{nl} - \Pi_l$) approaches the destructiveness of violence D. In contrast, when non-locals approach local strength $s_l \to 0$, peaceful co-existence can be sustained for higher levels of inequality:($\Pi_{nl} - \Pi_l$) $\to 2D$.

[29]Note that the violation of IC_v occurs even with full production by non-locals. If a non-local tried to unilaterally reduce production, profits would be even higher for other non-locals. One possibility that might sustain such higher profits for some would be if the increase in profits to other non-locals does not offset the expected reduction in payoffs to a local that results from being matched with a non-producer. This would relax IC_v. However this could not occur in the one shot game, as all non-locals prefer either to leave, or produce with the expectation of violence over receiving nothing.

[30]One could imagine an extension where the non-local minority raises barriers to other non-local entrants to maintain the threshold minority size.

population:$\overline{N_{nl}}$) or substitutes (local producers would prefer there be *no* non-locals).[31]

9.2 Peaceful co-existence over long time horizons

So far we have found that under restrictive assumptions, peaceful co-existence can exist even in environments without repeated interactions. Large numbers of competing non-locals can support peaceful coexistence. This equilibrium depends on the destructiveness of violence to deter aggression. The profits of the weakest (i.e. non-local) agents need to be pushed down to low enough levels that they are not worth expropriating, yet high enough that non-locals prefer to stay even as profits fall with the rise in the non-local population.

We now consider what conditions are necessary to sustain cooperation between individuals when there are longer time horizons. Suppose now that $\delta \in [0,1]$ and the stage game is played an infinite number of times. The key difference between the repeated game and the stage game is that locals and non-locals can now employ the threat of leaving and the threat of ethnic violence as strategies for punishing deviations and for ethnic cleansing: whereas before agents made decisions in anticipation of future violence, now individuals can decide to leave following a previous period's violent outbreak.

Recall that in the one-shot game, tolerance can be achieved even when there is economic competition. Over time, however, the ability to leave, and to induce leaving through violence can change these incentives. This will hinge on the extent to which the outside option is attractive. Let us define the $\underline{L}(N)$ as the minimal outside option such that for any population size N and match process, non-locals will prefer to leave rather than be subjected to repeated violence.[32]

$$\underline{L(N)} \equiv (1 - F(s_l))[\Pi_{nl}(1, N-1) + \Pi_l(N-1, 1)] - D \tag{8}$$

[31]We can thus easily incorporate an extension with period 0 voting over non-local immigration. Note in particular that if non-producing local *consumers* are pivotal, a pro- immigration policy will be adopted, regardless of whether non-locals provide substitutes or complements to local producers, as either way, consumers will enjoyed reduced prices for both local and non-local goods. If local *producers* are pivotal, then they will adopt an immigration policy encouraging of non-locals that provide complements and against non-locals that provide substitutes. There are obvious parallels with recent discussions over Brexit and US and EU immigration policy.

[32]Note that non-locals actually leave if targeted with violence if:

$$L > (1 - \mathbb{P})\Pi_{nl}(N_{nl}, N_l) + \mathbb{P}[(1 - F(s_l))(\Pi_{nl}(N_{nl}, N_l) + \Pi_l(N_{nl}, N_l)) - D] \tag{7}$$

To make the lower bound L satisfy the leaving constraint for all potential match processes, we allow $\mathbb{P} = 1$. Then the incentive constraint to leave following violence is:

$$L \geq \underline{L} \equiv F(s_l)[-D] + (1 - F(s_l))[\Pi_{nl} + \Pi_l - D].$$

Or:

$$L \geq \underline{L} \equiv (1 - F(s_l))[\Pi_{nl} + \Pi_l] - D.$$

The left hand side is the period gain to a non-local leaving, which is offset by the gains from staying when faced with violence. In that case, with probability $F(s_l)$, the non-local loses their profits from production. With probability $1 - F(s_l)$, they prevail in the conflict, both retaining their own profits and gaining that of the matched local. Regardless, they incur the cost D of violence. To make $\underline{L}$ robust to any non-local population for a given local population, we exploit the monotonicity of the profit function, where the profits will be highest for a non-local monopolist. This yields the expression below.

Notice that for a given population, the minimum L is decreasing in the relative armed strength of the local population and decreasing in the destructiveness of violence.

Now we take the interesting case where the outside option is such that non-locals leave when threatened with violence, but the populations of groups are such that violence is potentially attractive.

Proposition 2 (Peaceful co-existence over long time horizons)**.** *Suppose* $L \geq \underline{L(N)}$ *and* $F(s_l)\Pi_{nl}(N_{nl}, N_l) > D$*. Then for any given local population* $N_l < N$*, there exists a* $\delta^* \in [0,1]$ *such that for all* $\delta > \delta^*$*, a peaceful coexistence equilibrium exists* if and only if *locals and non-locals produce strict complements.*

Further if $F(s_l)\Pi_{nl}(N_{nl}, N_l) \leq D$ *, there exists a* $\delta^+ \in [0,1]$ *such that for all* $\delta > \delta^+$*, a peaceful coexistence equilibrium exists* if and only if *locals and non-locals do not produce strict substitutes (i.e. are weak complements).*

Proof: We first prove that forall $\{s_l, N_{nl}, N_l, D\}, \exists \delta^+ \in [0,1]$, such that for any $\delta > \delta^+$, a peaceful coexistence equilibrium exists *only if* locals and non-locals do not produce strict substitutes. We prove this *Inverse Folk Theorem* by contradiction.

Suppose instead locals and non-locals produce strict substitutes. Locals will attack non-locals if

$$F(s_l)\Pi_{nl}(N_{nl}, N_l) + \frac{\Pi_l(N_l, N_{nl}-1) - \Pi_l(N_l, N_{nl})}{1-\delta} \geq D \tag{9}$$

where the first term on the LHS is the first period gain to violence, and the second term is the continuation payoff. Observe that $\Pi_l \downarrow N_{nl}$ because locals and non-locals provide strict substitutes and thus the continuation payoff to locals from the *departure* of any non-local $\to \infty$ as $\delta \to 1$. Thus, we can always find a $\delta^+ \in [0,1]$ above which violence is profitable. Furthermore, for $L > \underline{L}$, and faced with continuation strategies of $\{violence, violence\}$, non-locals always leave in anticipation of violence.

Now we show that, *if* locals and non-locals produce strict complements, for any given local population $N_l < N$, there exists a $\delta^* \in [0,1]$ such that for all $\delta > \delta^*$, a peaceful coexistence equilibrium exists with the following strategies: no one leaves, everyone produces, no violence. If a non-local targets a local with violence, a local always engages in violence if matched with that non-local. If a local targets a non-local, then the non-local leaves. Having engaged in violence with an agent, agents always engage in violence with that agent.

Solving backwards, we need to check constraints for each agent to engage in violence with all possible matches. The binding constraint, as before, is for a local deciding to engage in violence with a non-local.[33] Since agents provide complements, $\Pi_l(N_l, N_{nl-1}) - \Pi_l(N_l, N_{nl})$ is negative in

[33]Note that for the other matches: $IC_v(l,l)$ and $IC_v(nl,nl)$: everyone is symmetric and $F(0) = \frac{1}{2}$. Agents matched with one of their same type prefer peace if: $F(0)\Pi_j(\cdot) - (1-F(0))\Pi_j(\cdot) < D$ or $\Pi_j(2\frac{1}{2}-1) < D$. This is always satisfied for $D > 0$. Similarly for $IC_v(nl,l)$: Since $s_{nl} < s_l$ and non-local profits are higher, if a local prefers peace when matched with a non-local, then the non-local will also prefer peace when matched the local, so this constraint does not bind.

(9) and the LHS $\to -\infty$ as $\delta \to 1$. So a $\delta^* \in [0,1]$ exists where this constraint is satisfied. Notice that strict complements are not only sufficient but also necessary for peaceful co-existence if the one shot gains from violence exceed the one shot losses $F(s_l)\Pi_{nl}(N_{nl}, N) > D$.

Finally: suppose locals and non-locals produce goods that do not affect each others' payoffs (are not strict substitutes). Then a peaceful coexistence equilibrium can still exist without strict complements but only if it exists in the one shot game, i.e. $F(s_l - s_{nl})\Pi_{nl}(N_{nl}, N) \leq D$. This leads to the modification in the proposition above. □

Thus, over long time horizons, inter-ethnic complementarity is not only desirable to support peaceful co-existence, it becomes necessary in our basic framework in environments where violence is cheap $D \downarrow$ and $L \geq \underline{L}$. However, this complementarity must also be robust in a particular sense. Suppose also that at a finite fixed cost X, members of the local group could replicate (or expropriate) the means of production of the non-local group. Then it is easy to show that over long time horizons, (δ high enough), there will be an incentive for locals to do just that. But in subsequent subgames, for the given L, these newly trained locals and non-locals will then provide substitutes, and thus newly-trained locals will have an incentive to engage in violence to encourage non-locals to leave. Thus, over long time horizons, peaceful co-existence needs to be supported both by inter-ethnic complementarity and by high costs of replication and expropriation of the means of production.

9.3 Extension 1: Vulnerable Indigenous

Recall from Proposition 2 that falls in the outside option L for vulnerable non-locals that produce complements below $\underline{L}$ make it less credible that non-locals will leave following an episode of expropriative violence. This can therefore lead to a breakdown in peaceful coexistence. This is accentuated for locals, for whom $L = 0$. We now examine the subcase whether peaceful coexistence can still be sustained in equilibrium over long-time horizons when it is *locals who produce robust complements and are militarily vulnerable.*

Observe first that $0 = L < C$ so rather than IC_L, it is IC_P that binds. In a repeated game, without the option to leave, the only sanction locals can use to deter expropriative violence is to withhold production, receiving 0. This will work if the military strength of individuals from either group is similar and local profits $F(s))$ and Π_l are low enough to make the cost of violence a deterrent. If, instead we allow non-violent transfers, then in the absence of further frictions, non-locals should be able coerce production perfectly, rendering locals indifferent, with a payoff of 0.

How then can vulnerable locals prosper from inter-ethnic trade? Suppose now production is a function of a decision to exert effort in production, plus a stochastic component $\epsilon \sim (0, \bar{\epsilon}), iid$, that can only be monitored at cost M. This monitoring cost raises the costs of coercively enforcing production. Instead, as M rises, it can be shown that non-locals will prefer to allow Π_l to rise to incentivize production rather than use a coercive strategy based upon verifying each realization of ϵ and punishing underproduction.

9.4 Extension 2: Contagion

Returning to the vulnerable outsiders case, recall that the presence of a sufficiently good outside option $L \geq \underline{L}$ for non-locals is key. If, in the presence of complements, non-locals do not credibly leave if subjected to violence, then there will be a discontinuous incentive for strong locals to expropriate profits today, without an offsetting cost in terms of the continuation benefits from future trade: the only offsetting loss is the destructiveness of violence D. In contrast, if non-locals provide substitutes, then there is also a discontinuity, in this case a relaxation of the incentive to engage in violence as one loses the continuation gain from reduced future economic competition.

Thus small changes in the outside option can have dramatic effects on the extent of ethnic tolerance in a society, depending on whether groups provide complements or substitutes. This can lead to waves of violence as well as lead to contagion. To see this, let there be two cities or countries. One can think of the other city or countries as the "next best option" for a non-local to migrate too, with some transportation cost $d > 0$ between them. The United States provides a focal example of this for many Europeans prior to 1914.

Within each city, there are locals, producing A and non-locals producing B.

Contagion of tolerance with complementarities Suppose non-locals are minorities in both cities, and produce complements. Then suppose the gains to non-locals in leaving City 1 for City 2 improves due to reduced transportation costs, lower immigration barriers, or irreversible investments in 'institutions' that reduce incentives for violence etc. This improves L for individuals in City 1, and thus if the new $L \geq \overline{L}$ can sustain allow City 1 to sustain peaceful coexistence with higher minority profits. Further: this is reinforcing: the improving conditions in City 1 directly imply an increase in the outside option L for City 2, further relaxing the incentive constraints for violence there.

Contagion of violence with substitutes As a corollary, ironically, reducing transportation costs, lowering immigration barriers etc., can lead to *increased violence* if non-locals provide substitutes. Similarly, raising immigration barriers to the next best alternative may lower violence as immigration becomes more difficult.

9.5 Extension 3: Dictators and ethnic cronyism

So far, we have been examining the incentives for violence in a society where the "state" is only reflected in the relatively high "armed strength" of locals. Instead, suppose we allow for heterogeneity among locals: allow one local- henceforth the "Local Boss" (lb) to have higher armed strength than other locals, i.e. $s_{lb} > s_l > s_{nl}$.

Notice that because the Boss is also a local producer, he will have an incentive to engage in violence against other substitute local producers to encourage them to stop production. Thus to sustain peaceful co-existence in this environment we can allow post-production, pre-violence transfers ("taxes"). Notice also that the incentives for violence against non-locals will bind first

for the Boss. If non-local profits are high enough or in periods of crisis, when time horizons are short (δ is low), the Boss will have an incentive to engage in expropriative violence against non-locals. The best response for non-locals,then, is to engage in transfers to the Boss in exchange for "protection". Further, in the presence of such period transfers, the Boss can credibly commit to punishing locals that engage in violence with non-locals. Thus there can emerge a relatively stable "ethnic cronyism" peaceful co-existence equilibrium.

However, this ethnic cronyism equilibrium can engender perverse incentives for dictators. Suppose there are i.i.d. shocks to the profits for non-locals, which are not observable by the Boss. Then, following Abreu, Pearce, and Stacchetti (1990), low realizations, and associated low transfers can trigger expropriative violence along the equilibrium path, as the Boss is forced to maintain incentives for transfers by punishing low realizations even if they reflect underlying conditions.