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The Strategic Development of Border Areas: Explaining Variation in Interaction Opportunity Across Land Borders

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The ability to interact with others is a necessary condition for the emergence of both cooperative and conflictual interstate relations. Yet, the spaces separating states vary in terms of the opportunities they offer for contacts to take place: some borders are difficult to traverse, others are not. Building on Harvey Starr and G. Dale Thomas's work on the permeability of land borders, we test the three most prominent hypotheses about the forces that shape cross-border interaction opportunities. The results confirm that that the desirability of trade influences the accessibility of borders. However, the anticipated relationship between state capacity and accessibility does not materialize clearly. Finally, our results suggest that governments invest in transportation infrastructure when facing threatening neighbors, resolving a debate over the relationship between mobility and security in favor of those who argue that accessible borders facilitate military defense.

KEYWORDS *borders, conflict, contiguity, geopolitics, trade*

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While the public fixates on globalization and the technologies that tie far flung regions of the world together (for example, Friedman 2007), experts know that many important international processes are still most likely to play out between neighbors. In this age of global markets, the state with the world's largest economy trades more with its northern neighbor, Canada, than any other country in the world. Conflict processes are similar. While clashes between distant states can and do erupt, militarized disputes and wars are still far more common between neighbors than between states that do not share borders (Hensel 2000; Vazquez 1995).

It is no wonder, then, that geographic proximity remains central for understanding the dynamics of conflict and cooperation (for example, K. Gleditsch 2002; Lemke 1995). In the quantitative literature on interstate conflict, the relationship between contiguity and conflict is so tight that measures of proximity are near necessary elements of predictive models (Geller and Singer 1998). Distance also plays a significant role in studies of trade flows (Robst, Polachek, and Chang 2007; Simmons 2006), the development of "security communities" (Adler and Barnett 1998; Deutsch, Burrell, Kann, Lee, Lichterman, Lindgren, Lowenheim, and Van Wagenen 1957), and the location of transnational terrorist attacks (Blomberg and Hess 2008). At its core, distance influences the chances people and governments have to interact with one another out of which collaborative and combative patterns emerge (Diehl 1991). States situated near one another interact more than distant parties, leading to increased opportunities for both collaboration and hostility.

Yet, border regions vary in terms of the opportunities they offer for interactions to take place on a mass scale (Lemke 1995; Starr and Thomas 2002, 2005). The border between Brazil and Venezuela, for example, is arguably the least permeable land border in the world, while the land border between Brazil and Colombia is among the most porous (Starr and Thomas, 2002). Border length does not explain this disparity. The correlation between the ease of cross-border interaction and border length, generated using data gathered by Harvey Starr and G. Dale Thomas (2002) is negative and miniscule ($r = -.06$). Mountainous terrain (see Fearon and Laitin 2003) makes borders less passable ($r = -.63$), yet hills and valleys have not prevented the construction of transportation links across national boundaries since the Industrial Revolution.Why, then, do some land borders provide a more extensive underlying network supporting cross-boundary interactions than others?

Historical work on international boundaries suggests several reasons people invest in infrastructure designed to make cross-border travel easier, but few efforts have been made to assess these hypotheses. Our work addresses this gap with a study of three prominent conjectures about the factors that motivate the development of cross-border transportation networks. Consistent with previous research, we find that the desirability of trade influences the development of road and railroad networks across land borders. The anticipated relationship between state capacity and road and railroad networks, however, failed to materialize clearly. Instead, we find either no relationship or contradictory relationships between capacity and transportation infrastructure. Finally, our results resolve a debate over the relationship between mobility and security in favor of the argument that governments invest in transportation infrastructure when facing threatening neighbors.

At the broadest level, our findings imply that the opportunities for interaction borders provide are shaped by the very processes they are used to predict. In other words, borders do not simply exert an independent effect on the probabilities of conflict and cooperation even though they are usually treated as exogenous to those processes. Instead, our evidence suggests that the nature of borders is endogenous to the interactions that shape interstate relations. More or less interstate violence and trade is not only conditioned by the relative availability of interaction opportunities. Rather, interaction opportunities are themselves products of prior expected levels of violence and trade.

Our findings also raise questions about the idea that there are independent vicious and virtuous cycles that determine whether dyadic relations remain cooperative or conflictual (Russett and Oneal 2001). Both security pressures and trade incentives can lead to the development of transportation networks in border areas. What this means is that the experience of Germany and France may be an extreme, but ultimately characteristic model for the way states emerge from rivalries. Historically, investment in transportation infrastructure in the French-German border region was driven by each government's insecurity *vis-à-vis* one another. While this investment undoubtedly made it less costly for Germany and France to wage war against one another, it also set the stage for integrative processes to take hold that made continued violence unattractive.

At stake in this research are questions about the development of *opportunities* for large-scale cross-border interactions as distinct from the *willingness* of people to pursue cross-border relations (for more on these terms, see Most and Starr 1989). This effort to isolate the structural prerequisites for interaction distinguishes our work from studies that build the nature and density of cross-border traffic into their analytic foci (for example, Martinez 1994). We know that the rules and practices government agents use to govern border areas and the desires of people to connect across international boundaries influences cross-border relationships (Gavrilis 2008). What we do not know is how the chances for interaction arise even though the infrastructure that permits cross-border contact is a prerequisite for modern warfare and trade. Are transportation networks developed with these interactions in mind or are they primarily an unintended by-product of the domestic processes of economic development and government efforts to maximize control over their territories?

One reason we know so little about how border areas are developed is that the techniques used to assess differences in border regions rely on assumptions, rather than observations, about the ease of interaction across international boundaries. Starr and Thomas's (2002, 2005) work is an important exception, but its value has been exploited only sporadically. In the following section, we review extant approaches to measuring the nature of borders and make the case that more attention to Starr and Thomas' work is useful for making progress on questions relating to the ease of interaction across border areas. Next, we describe the main explanations for the variable accessibility of land borders. We conclude with a discussion of research design, a report on our findings, and reflections on what our analysis means for understanding international relations.

INTERACTION OPPORTUNITIES IN THEORY AND SCIENTIFIC PRACTICE

Studies of international cooperation and conflict have long recognized that it must be possible for actors to interact for political relationships to develop (Most and Starr 1989). It is for this reason that the proximity of actors to one another figure prominently in empirical models of interstate relations. At root, the physical distance that separates actors is a fundamental determinant of the opportunities they have to relate to one another.

Unsurprisingly, a great deal of scholarly attention is devoted to measuring spatial relations among states.The most widely used instruments focus on a single spatial dimension to gauge one state's position relative to another. Measures of inter-capital city distance (Gleditsch 1995; Gleditsch and Singer 1975; Lemke 1995) and tripartite categorizations of contiguity (Bremer 1992; Diehl 1985) exemplify this approach. More recent contributions include Gleditsch and Ward's (2001) "minimum country distance" measure and Gleditsch and Ward's (1999) measure of border length (see also Starr 2001).

While the various measures of proximity effectively gauge the extent to which the space between states influences interactions, they presume the opportunities for contact are the same across equivalent distances (c.f. Lemke 1995; Vasquez 1995). This is implausible. It implies that it is as difficult to cross a mile of the United States–Canadian border using a multilane highway as it is to cross undeveloped sections of Bhutan and Tibet's border along the Himalayan Mountains.

The inability to distinguish the extent to which different borders enable interaction is significant. The capacity of states to engage in the kinds of large scale interactions most often of interest to political scientists are bound to be limited by the physical accessibility of their border regions. The uneven distribution of easily penetrable borders suggests that analyses supporting links between proximity and either interstate conflict or cooperation overstate the degree to which distance facilitates these outcomes. Both military and economic actors rely on robust transportation networks, but not all borders provide the pathways necessary to support large-scale interactions. Consequently, some neighboring countries are able to interact with one another far less than their proximity to one another might otherwise suggest.

One solution to this problem of measurement insensitivity was offered by Starr and Thomas (2002, 2005), who developed a more granular estimate of the openness across land borders around the world using the 1992 GIS Digital Map of the World. Their measure was designed to capture variance in the physical accessibility of border regions. Starr and Thomas conceptualized the ease of interaction across international boundaries as a composite of man-made structures (roads and railroads) and topographical features (for example, mountains) that made travel from place to place more or less difficult.[1] The resulting measure provides one of the most nuanced assessments of the ease of interaction across land borders around the world.

Starr and Thomas's work is a welcome addition to research on the political geography of conflict and cooperation. The road and railroad networks that connect states are vital to the conduct of many of the international interactions that occupy the attention of scholars and practitioners alike. Adequate roads and railroads are a prerequisite for modern military clashes, as today's armies require robust transportation networks to move from place to place (Strachen 1983; Van Creveld 1977). Indeed, following the procedure outlined by Braumoeller and Goertz (2000), our research suggests that more extensive road and railroad systems were necessary for the onset of military conflict between 1972 and 1993 (the study period for this research).[2] We could not show a necessary relationship between road and railroad networks and interstate trade, but it is clear that modern economic exchange also relies on well-developed transportation networks. Nevertheless, not all borders provide pathways capable of supporting high volume exchanges of goods and services.

Starr and Thomas's work has not enjoyed wide use, however. The reason for this, we suspect, is that their measures are applicable to a roughly 30-year period (1971–2002) rather than the nearly 200-year stretch

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[1]Starr and Thomas (2002, 2005) also introduced measures of border "salience" and "vitalness." We do not address these measures in this paper.

[2]We examined the incidence of Militarized Interstate Disputes across the 29 least accessible borders in the world. Some transportation infrastructure exists across every land border, so it is impossible to observe whether MIDs occur when states are denied opportunities to interact. We assumed, therefore, that borders in the 10th percentile of road and railroad networks are so inhospitable to cross-border traffic that they are a useful proxy for dyads with no transportation infrastructure. Still, we uncovered 41 MIDs between these poorly networked states, but this incident rate is consistent with what we expect assuming a 5% rate of measurement error. In short, we cannot reject the hypothesis that this incident rate of MIDs results from errors in the identification of either border accessibility or MIDs.

researchers typically use. Nevertheless, Starr and Thomas's ease of interaction measure is invaluable for studying the potential for cross-border interactions because it replaces assumptions about the foundations for crossing international boundaries with information about cross-border road and railroad systems. These man-made structures modify distance and, therefore, are critical determinants of the chances neighboring states have to interact with one another. Why, then, do some adjoining states have more extensive cross-border transportation networks than others?

SECURITY, PROSPERITY, CAPACITY, AND THE PERMEABILITY OF LAND BORDERS

The legacy of inattention to the factors that promote more permeable borders is that the field of political science does not have developed theories designed to explain variability in cross-border transportation systems. Our review of historical work on this subject suggests that there are three major explanations for these infrastructure investments. The first is that road and railroad networks tend to be more developed when the gains from trade are expected to be great. The second explanation is that extensive cross-border transportation systems are a function of state capacity. Dyads comprised of states that have more resources to invest in roads and railroads tend to have more extensive cross-border transportation networks. Similarly, cross-border transportation networks tend to be more extensive in dyads that do not have to contend with transnational minority groups who are capable of thwarting infrastructure development. Both of these arguments are uncontroversial, but neither has been tested against the null hypothesis nor examined side-by-side in statistical models.

The third explanation for variation in the number of roads and railroads that connect neighboring states focuses on security concerns. Like the arguments mentioned above, the relationship between security concerns and transportation structures remains untested. Unlike the other explanations, precisely how security concerns influence road and railroad construction is a matter of debate. Some argue that security concerns reduce the willingness of governments to invest in cross-border transportation structures to make it more difficult for enemy armies to penetrate their neighbors' territories. Others make the opposite claim: security concerns increase the willingness of governments to invest in roads and railroads to improve their own ability to mobilize against external threats.

Before reviewing each of the explanations we identify, it is worth pausing to note that the three arguments about infrastructure investment are interesting because they focus on salient variables in political science (trade, security, and capacity) and because they point to a deeper tension about the sources of state behavior. The arguments about trade and security suggest that the development of border areas occurs in response to pressures from abroad. The relationships with neighbors are critical. The argument about state capacity, on the other hand, suggests that infrastructure investments are driven by internal political dynamics. External pressures are secondary in this account.

The Expected Benefits of Trade

Stripped to its core, the economic demand for modern roads and railroads stems from the desire for faster, more reliable, and less expensive modes of transportation. Roads and railroads facilitate interactions through space by reducing the costs of travel from one place to another. Even with the rise of air travel, it is still typically less expensive to move people and goods short distances along highways and railways than though the air.[3] The development of rail and road systems greatly reduces the costs and increases the speed of movement enhancing possibilities for interactions with neighbors, overcoming the limitations imposed by difficult terrain.

Historically, roads and railroads generated their advantages as methods of transportation by transforming travel in three ways. First, roads and railroads provided relatively uniform pathways along which people and goods moved, reducing the difficulty of traversing rough, steep, and uneven terrain. The fledgling U.S. Government, for example, built roads through otherwise difficult-to-traverse terrain to encourage westward expansion and the sale of new public land (Lay 1992:94–95). Well-constructed roads and railroads also reduced the effect of inclement weather on mobility by withstanding the decaying effects of the elements and human use more effectively than the irregular paths people cut for themselves.

Second, roads and railroads reduced transportation costs by increasing the speed at which people and goods moved from place to place. Speed gains resulted from the taming of difficult terrain and the relative uniformity of roads, but tracks and roads also set the stage for the introduction of faster, mechanized vehicles. Finally, roads and railroads reduced the costs of travel by increasing the carrying capacity of human pathways. In the past, one of the important impediments to travel was the inability of many pathways to support the sheer weight of the people and goods being transported (Lay 1992). As the science of road building improved and railroads were introduced, weight became less of a factor in travel.

Because roads and railroads reduce the costs of travel, their economic value has never been seriously challenged and both governments and private economic actors have invested in road and railroad construction to

[3]The preference for ground travel is clear in North America: across the U.S.-Canadian border more than 80% of customs inspections occur at land border crossings, and three-quarters of NAFTA trade is conducted via trucks (Armbrister and Meyers 2010).

realize the benefits of trade. As early as 586 B.C., Assyria's King Esarhaddon had roads laid throughout his kingdom to facilitate and encourage trade (Lay 1992:45). In Europe, toll roads were often built by private interests for the purpose of profiting from the more frequent economic exchanges that came with easily accessible borders (McNeill 1984:163). Economic motives were also behind important railroad projects. Russia's Trans-Siberian railroad, for example, was spearheaded by Sergei Witte, the Minister of Finance, who used the railroad network to encourage heavy industry (Riasanovsky 1984: 398). When it comes to economic exchange, the basic dynamic appears to be that the more lucrative cross-border interactions promise to be, the more likely actors are to invest in infrastructure supporting cross-border contacts.

State Capacity

The second uncontested claim about the development of roads and railroads at the border is that the extent of these transportation networks is influenced by the internal challenges governments and citizens face investing in and building transportation infrastructure. On this account, more open borders are an unintended by-product of internal efforts by governments to extend their reach across their societies. The variable permeability of borders is a testament to differences in the resources governments have at their disposal. Road and railroad construction, after all, requires substantial investments and many states are not developed enough to support such large projects (Randolph, Zeljko, and Bogetic 1996).

For other states, the problem is not resources *per se*. Rather, many governments face resistance from transnational minority groups to their efforts to establish roads and railroads throughout their territory. In 1993, for example, the Tamil Tigers (LTTE) destroyed the A-9 road connecting the northern port city of Jaffna with the southern city of Kandy. Subsequent violence by the LTTE prevented the Sri Lankan government from reopening the road and rebuilding infrastructure in the region (Wijesingha 2007). Transnational minorities struggle with governments over the building of roads and railroads because they have been used as mechanisms of control since Roman times. The boulevards in Paris, for example, were designed with the needs of a defending army in mind and laid in areas where insurrections took place in 1848 (Lay 1992:97). Abkhazian separatists destroyed the rail line connecting Abkhazia to Georgia, recognizing the danger it posed to their independence. As Abkhazia's de facto Minister of Foreign Affairs explained, the railroad was attacked because "[w]e [remembered] how Georgia had planned to use the railway in 1992 to deploy troops and equipment overnight to three locations into Abkhazia and seize it. If the Zviadists hadn't blown the bridge, they may have succeeded" (Rimple 2005). Underscoring the point, shortly before the

Russian-Georgian war, Russia *rebuilt* the rail line from Sochi to Abkhazia in part to separate that province from Georgian control.[4]

As Salehyan (2009) points out, many states must contend with minority groups whose homelands traverse international boundaries and identify with other national communities. Because these groups are at least partially beyond the reach of individual governments, they limit the ability of those governments to undertake initiatives in the group's territory. The transnational character of these groups allows them to access resources and engage in activities that governments would not otherwise tolerate. Their ability to shift their oppositional activities inside and outside international boundaries gives transnational groups an advantage over territorially-bound governments.

Security

While the economic and internal capacity arguments about why some neighbors have more permeable borders than others are clear, the influence of security pressures on the development of cross-border transportation networks is controversial. From a military standpoint, roads and railroads are attractive because they facilitate mobility. The problem is that any advantages roads and railroads provide to one's own military may also aid enemy militaries. Hence, the debate boils down to a dispute over whether states are better off building roads and railroads to maximize their own mobility or avoiding these projects to make incursions more difficult.

The *mobility thesis*, championed by the German economist Friedrich List and German General Helmuth von Moltke, concludes that the best way to deal with threatening neighbors is to increase the density of the transportation network in the border area. List and Moltke argued that, on balance, added mobility aided defenders who had to react to the moves attackers made on the battlefield more than the invaders (Van Creveld 1977:88). While greater mobility might make conquest more attractive by reducing the costs attackers paid to mobilize their own forces, these reductions were thought to be more than offset by the ability of internal military forces to shift rapidly from one place to another and meet enemy attacks.

In contrast, the *immobility thesis* suggests that the optimal strategy for dealing with threatening neighbors is to restrict their opportunity for cross-border interactions by minimizing the extent of the transportation network in the border area. This view is most closely associated with Prussia's King Frederick II, but it is also consistent with contemporary arguments by Vasquez (1995) and Lemke (1995) that wars are more likely to take place

[4]Interview with Abkhazian President Sergey Bagapsh. *Russia Today*, August 9, 2009.

across accessible borders. Frederick II argued that structures which made militaries more mobile make the states that possess them more vulnerable to outside attack (Herrera 2004). The reason is that such transportation networks, which can be seized and used to coordinate and hasten invasions, provide attackers a "first-move advantage" (Van Evera 1999) that defenders cannot overcome.

Recognizing this danger, some governments developed their transportation networks in ways that made seizure of these assets difficult. Russia, for example, did not adopt European standard gauge track widths in order to stem the threat of offensive military action across the continent (Herrera 2004:251–53; Quester 1988:82). Still, even with such efforts, the presence of a well-developed road and rail system is, from this perspective, risky. The surest means of minimizing the security threat from neighbors is to make the border area as inaccessible as possible, keeping the barriers to foreign invasions high.

HYPOTHESES

The explanations described above give rise to several testable hypotheses about variation in the permeability of land borders. First, *the extent of the road and railroad networks in the border area varies with the desirability of trade within dyads*. "Gravity models" (see Simmons 2006 for an overview) suggest the appeal of trade is a function of the size of neighboring economies (Bergstrand 1985), the distance between them (Isard 1954), and their general openness to trade.

Second, the *permeability of borders is associated with increasing governing capacity within dyads*. *More economically-developed dyads will have more extensive cross-border road and railroad networks* because governments in these neighboring states have more capital to invest in infrastructure than their more resource-poor counterparts. Development levels, however, are only part of the story. Dyadic capacity is also influenced by the presence of separatist minorities. All things equal, *borders spanned by transnational minority groups are less likely to have extensive road and railroad networks* because these groups can resist infrastructure projects. Groups with ties to powerful kin may be an exception, however, since governments might work harder to control these actors. Hence, *borders spanned by transnational minority groups with ties to powerful kin in neighboring states are more likely to have extensive road and railroad networks than borders without connected minorities*.

The final set of hypotheses probe the relationship between border permeability and security threats. Previous research shows that the most dangerous borders are those that lie between states that have recent conflict experiences (Beck et al. 1998), are not both fully democratic (Russett and

Oneal 2001), and are situated between states with similar military capabilities (Bremer 1992). "Settled" borders are also less likely to be the sites of conflict than unsettled ones (Gibler and Tir 2010; Tir 2003). If the mobility thesis is correct, then *the more dangerous borders, that is, those where the probability of conflict is highest, should offer more interaction opportunities*. Thus dyads experiencing fewer peace years, having less democratic states, and similar military capabilities will have the least permeable borders. Conversely, if states deal with security threats by making borders difficult to cross, then *the most conflict-prone borders will offer fewer interaction opportunities than borders with lower conflict risk*.

RESEARCH DESIGN

We used Starr and Thomas's (2002, 2005) dyadic measure of *interaction opportunities* as our dependent variable. This measure combines information about road and railroad networks with information about the hypsography of the terrain within twenty-five miles of the border in every land dyad in existence in 1992. Starr and Thomas assigned nondirectional scores for each segment of the border using a four point scale (1 = lowest) and averaged the results, creating the interaction opportunity score for the entire border. This variable's observed range runs from a low of 1.195 along the Brazilian-Venezuelan border, to a high of 3.296 along the Belgian-French border. The average land border lies between Rwanda and Tanzania (*opportunity* = 2.627). Figure 1 displays the opportunity scores for (approximately) every tenth dyad in our data set.

We predicted the observed variation in interaction opportunities using a standard set of covariates pegged to their 1971 values. Road and railroad systems lead dyadic trade flows and conflict dynamics. The main question is how long it takes states to develop these networks. Research on the transport-building cycle suggests that road and railway building projects last roughly twenty years (Isard 1942). We used observations one year outside this 20-year time frame to ensure that our analyses anticipate these investments in transportation infrastructure.

One consequence of the decision to lag the independent variables is that our initial models include only 200 of the 301 land borders Starr and Thomas catalogued. The process of decolonization in Africa and Asia and the breakup of the Soviet empire, among other developments, produced ninety dyads by 1992 that did not exist in 1971. The 1992 Czech-German border, for instance, has no 1971 analog. Eleven other dyads were dropped because of missing data for the independent variables. We do not believe these losses bias our results since the mean openness scores for the 200 cases in our analysis are virtually indistinguishable from the mean openness scores for all 301 dyads (2.627 vs. 2.604). Nevertheless, in subsequent analyses we

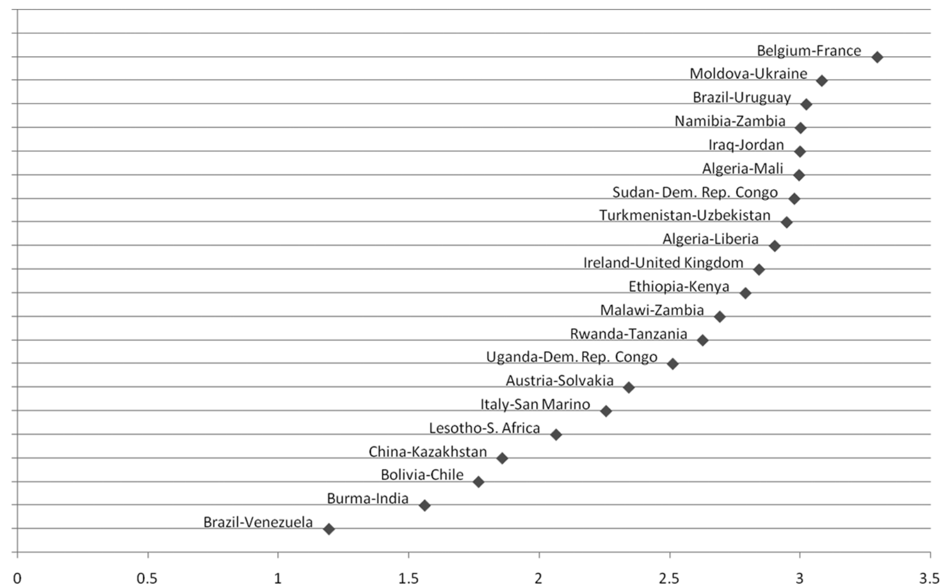

FIGURE 1 Opportunity scores for selected dyads.

tried to maximize the number of cases under consideration by analyzing the 1971 cases alongside new dyads as the latter came into existence.

The independent variables in our models are as follows. We examined the relationship between trade and interaction opportunities using variables measuring the total gross domestic products within dyads ("dyadic GDP"), the distance between capital cities (a common proxy for the costs of transporting goods from one locale to another), and each dyad's openness to international trade. Data for *dyadic GDP* and *dyadic trade openness*, a measure of total dyadic imports and exports divided by GDP, comes from Gleditsch (2002). Data measuring inter–capital city distances is drawn from the Correlates of War project.

We gauged the resources available to dyads for infrastructure investment using the average GDP per capita of both states in a dyad. An advantage of *average GDP/cap* is that it has relatively few missing values. However, we also analyzed a series of models using data on tax extraction (*tax ratio*), a more standard measure of state capacity (Hendrix 2010; Kugler and Arbetman 1997; Thies 2005, 2010). The results using *tax ratio* are consistent with those generated with *average GDP/cap* (see Table 2). Hence, we opted to use *average GDP/cap* as our baseline measure since it enables us to maximize the number of available observations.

Our other measure of the difficulties governments have extending transportation networks throughout their respective territories focuses on transnational separatist groups whose regional bases span land borders. We used the Minorities at Risk data (2009) to identify the presence of such groups (1 = present) as well as to identify the subset of transnational groups that have ties to powerful kin in neighboring states (1 = powerful ties).[5] We created two indicator variables defining (1) powerful minorities as ones with ties to kin who dominated the ruling coalition in neighboring states and (2) powerless minorities as those that were not connected to ruling kin in either state in a dyad.

Threat levels along dyadic boundaries were measured four ways. First, we calculated the number of years of peace ("peace years") between neighbors using data on armed conflict from the COW project. This variable is consistent with the idea that the occurrence of prior conflicts tend to increase the probability of future ones (Beck et al., 1998). Second, we assessed dyadic power configurations using a binary variable designed to indicate when dyads had both major and minor powers in them ("major-minor dyads"). Third, we measured dyadic regime type using the average of the Polity IV scores for each dyad.

Last, we controlled for the hypsography of the terrain within dyads ("terrain"). We want to isolate the political and economic factors that drive cross-border investments, but we are unable to extract the hypsography scores from Starr and Thomas's data. We addressed this by introducing Fearon and Laitin's (2003) measure of mountainous terrain to account for the difficulty of building road and railroad networks across mountain ranges. A table of descriptive statistics for all the independent variables appears in the appendix.

ANALYSIS

We began our analysis using three separate models of the relationship between interaction opportunities and (1) trade incentives, (2) state capacity, and (3) security pressures. With just 200 cases to work with, it seemed prudent to adopt a strategy for maximizing the information available for generating parameter estimates. We did this by examining each school of thought on border openness with models using the minimum number of covariates necessary for examining the underlying hypotheses. We then included all the covariates in a single model. The results of this examination appear in Table 1.

Broadly speaking, the "mini" models and combined analysis suggest at least qualified support for the three sets of hypotheses about the availability of cross-border transportation networks. Roads and railroads are positively related to the incentives for trade within dyads, as expected. The relationship between state capacity and cross-border transportation

[5]We excluded dyads containing at risk minority groups that are also politically dominant in both states and identified connected minority groups using GC11 from the MAR data set.

TABLE 1 OLS Regressions of Interaction Opportunities

	Model 1	Model 2	Model 3	Model 4
Trade Incentives				
Dyadic GDP	−0.00003			0.0005**
	(0.0002)			(0.0003)
Distance	−0.00009*			−0.0001*
	(0.00005)			(0.00005)
Mean trade openness	379.39*			403.82*
	(202.80)			(214.69)
State Capacity				
Transnational minority		−0.10*		−0.13**
		(0.06)		(0.06)
Mean per capita GDP		0.000002		−0.000005
		(0.00002)		(0.00003)
Security Pressures				
Major-minor dyads			−0.16**	−0.21*
			(0.08)	(0.11)
Peace years			−0.003**	−0.003**
			(0.001)	(0.001)
Mean polity score			−0.001	−0.01*
			(0.005)	(0.01)
Mountainous terrain	−0.02***	−0.02***	−0.02***	−0.02***
	(0.00)	(0.00)	(0.00)	(0.00)
Constant	2.90***	2.96***	2.98***	2.92***
	(0.07)	(0.05)	(0.048)	(0.08)
Observations	204	204	200	200
R-squared	.44	.42	.44	.49

Standard errors in parentheses; $^{*}p < .1$; $^{**}p < .05$; $^{***}p < .01$.

infrastructure is mixed. Overall development levels have little impact on interaction opportunities. Transnational minority groups, in contrast, exert a modest influence on cross-border transportation networks. Our analysis also suggests that states respond to security threats by investing in cross-border transportation networks rather than restricting mobility across shared boundaries. Finally, the three models suggest that opportunity levels in border areas are negatively associated with the roughness of the *terrain* (Models 1, 2, 3, and 4: b = −.02, $p < .01$).

Model 1 reports the relationship between trade incentives and cross-border interaction opportunities. Consistent with the work using gravity models, the results indicate that border openness is positively related to dyadic *trade openness* (b = 379.39, $p < .1$) and inversely related to inter-capital city *distance* (b = −.00009, $p < .1$). These results are confirmed in Model 4 (*trade openness:* b = 403.82, $p < .1$; *distance*: b = −.0001, $p < .1$). All things equal, a one-standard-deviation increase in trade openness results in approximately a .11 increase in the openness of dyadic borders. An effect of this size would shift the Burmese-Indian border, one of the least open to trade in our data, seven places in our relative ranking of border openness. This is a small effect, not enough to move this border ahead of China and

Kazakhstan in Figure 1. (We selected dyads that appear in Figure 1 to help readers visualize the effects we found.) Changing inter–capital city distance by one standard deviation (−.113) produces an effect of similar size, but opposite direction.

Dyadic GDP (b = −0.00003, $p > .1$) provides the one unexpected result in Model 1, though it emerges as a significant predictor (0.0005, $p < .05$) of interaction opportunities when controls for the effects of security and state capacity are introduced (see Model 4). Based on this analysis, changing *dyadic GDP* by one standard deviation results in an 18% change in the interaction opportunities borders provide. In practical terms, a change of this size would shift the Burmese-Indian border roughly ten places, where it would be the equal of the Vietnamese-Laotian border and just two places shy of the Bolivian-Chilean border.

We checked the results on trade incentives by reexamining Model 4 using data on bilateral trade. Our indicators (the components of gravity models) are assumed to be predictors of incentives for trade, so we would expect that *bilateral trade* flows could also predict the presence of transportation networks. Indeed, it performs similarly to the trade measures used in Models 1 and 4 (see Model 5, Table 2). Consistent with our other results as *bilateral trade* increases, the interaction opportunities borders provide also increase (b = .000006, $p < .01$).[6]

Returning to Table 1, the relationship between state capacity and cross-border transportation networks (see Model 2) appears tenuous. In fact, none of our results show evidence that transportation networks in border areas are significantly related to measures of economic development. The level of economic development, captured by *mean GDP/cap* is found to be unrelated to the level of border openness in both Model 2 (b = .000002, $p > .1$) and Model 4 (b = .000005, $p > .1$). Alternative measures of dyadic resources do not change this result. As we mentioned above, using Kugler and Arbetman's measure of tax extraction (*mean tax ratio*) made little difference to our results (see Table 2, Model 7). The same is true for a weak-link version of *tax ratio* (see Table 2, Model 8). We also tried a dummy variable indicating dyads containing at least one "less developed country" as designated by the United Nations (1971). If state capacity is positively associated with more permeable borders, then it is reasonable to expect that dyads containing LDCs will have lower interaction opportunity scores, but our test does not bear this logic out. On the contrary, *LDC dyads* are positively associated with cross-border transportation (in Model 9, b = .22, $p < .05$).

The presence of transnational separatist groups does reduce cross-border transportation networks (in Model 2). This effect however is modest

[6]Model 5 uses an absolute measure of bilateral trade. Using a measure of bilateral trade as a share of dyadic GDP produces similar results.

TABLE 2 OLS Regressions of Interaction Opportunities Using Alternative Specifications of Selected Indicators of Trade Incentives and State Capacity

	Model 5	Model 6	Model 7	Model 8	Model 9
Trade Incentives					
Dyadic GDP		0.0005**	0.0004*	0.0005*	0.0005**
		(0.0003)	(0.0003)	(0.0002)	(0.0002)
Mean trade openness		403.94*	170.50	348.00	461.73**
		(215.27)	(259.88)	(216.59)	(199.78)
Distance		−.00009*	−0.0001**	−0.0001*	−0.0001**
		(0.00005)	(0.00006)	(0.00006)	(0.00004)
Bilateral trade	−0.000006***				
	(0.000002)				
State Capacity					
Trans. minority	−0.13**	−0.13**	−0.16**	0.14**	−0.13**
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Kin group in power		.005			
		(.094)			
Mean per cap GDP	−.000003	−.000007			
	(.00003)	(.00003)			
Mean tax ratio			−0.21		
			(0.70)		
Low tax ratio				−0.26	
				(0.60)	
LDC dyad					0.22**
					(0.09)
Security Pressures					
Major-minor dyads	−0.26***	−0.21*	−0.24	−0.25**	−0.20*
	(0.09)	(0.11)	(0.15)	(0.12)	(0.11)
Peace years	−0.004***	−0.004**	−0.004**	−0.004***	−0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Mean polity score	−0.01**	−0.01*	−0.01*	−0.01	−0.009*
	(0.006)	(0.006)	(0.01)	(0.01)	(0.005)
Mountainous terrain	−0.02***	−0.02***	−0.02***	−0.02***	−0.02***
	(0.002)	(0.001)	(0.00)	(0.00)	(0.00)
Constant	2.92***	2.92	3.05***	2.97***	2.88***
	(0.68)	(0.08)	(0.12)	(0.10)	(0.08)
Observations	200	200	159	184	200
R-squared	.49	.49	.52	.50	.50

Standard errors in parentheses; *p <.1; **p <.05; ***p <.01.

(b = −.10, $p < .1$): adding an at-risk minority to the Belgian-French border causes the border to fall from first to third in the relative ranking of dyads by opportunity scores. One explanation for the weakness of this result is that we do not take into account ties between minorities and kin groups in neighboring states. Carter (2010) argues that ties between transnational minorities and influential kin change the ability of states to exert control over border regions. We checked this but found that the power status of a minority's kin in a neighboring state appears to make no difference to the development of transportation networks (see Table 2, Model 6).

The weakness of the results for state capacity stand in contrast to the findings surrounding security concerns. Consistent with mobility thesis, our results suggest that the most conflictual borders also have the most well-developed transportation networks. Borders that lie between major and minor powers tend to have less extensive road and railroad networks than other dyads (see Table 1, Model 3, $b = -.16$, $p < .05$). Pairing a major and a minor power results in a reduction of about .16 in the interaction opportunities borders provide—enough to shift the relatively open Moldovan-Ukrainian border roughly seventy-five places. Its resulting peer group would include the Turkmenistan-Uzbekistan and Ethiopia-Kenya dyads (see Figure 1).

We also found a statistically significant, negative relationship between *peace years* and interaction opportunities (see Table 1, Model 3: $b = -.003$, $p < .05$). In other words, states that experience the most interstate conflict have the most developed transportation infrastructure. A one-standard deviation decline in the number of peace years would make the Rwandan-Tanzanian border a peer of the Ethiopian-Kenyan border, a change of nearly thirty places.

The surprise in Model 3 is that *average regime type* appears unrelated to interaction opportunities across land borders ($b = -.001$, $p > .1$). Although more democratic dyads should be less conflict prone than more nondemocratic dyads, the former's borders are indistinguishable from the latter's. This result, however changes when controls for state capacity and trade incentives are introduced in Model 4 ($b = -.01$, $p < .1$). Even so, we were unable to replicate the result using alternative measures of dyadic regime type. Neither Russett and Oneal's "weak link" measure for regime type (Table 3, Model 10) nor a dummy variable for jointly democratic dyads (not reported) generated statistically significant results.

Additional tests using variables tapping other indicators for the level of cooperation within dyads including shared memberships in international organizations (Pevehouse et al, 2004) and political affinity (Gartzke 2006) produced similarly disappointing results (see the appendix). Only a variable indicating alliances ties within dyads showed even a weak relationship to cross-border interaction opportunities (see Table 3, Model 11: $b = .10$, $p < .1$). We also failed to find an association between interaction opportunities and any neighborhood effects that might result from being situated in Europe, the region of the world that has done the most to promote the free movement of people and goods (see the appendix).

Finally, we checked alternative specifications for our terrain indicator. We replaced Fearon and Laitin's mountainous terrain indicator with two alternative measures. The first was a dummy variable we developed identifying borders with mountain ranges along them (0 = non-mountainous). We also tested an indicator, drawn from Anderson's (2003) *International Boundaries: A Geopolitical Atlas,* which measures the percentage of each

TABLE 3 OLS Regressions of Interaction Opportunities Using Alternative Specifications for Indicators of Security Pressures

	Model 10	Model 11
Trade Incentives		
Dyadic GDP	0.0004*	0.0004*
	(0.0003)	(0.0002)
Mean trade openness	410.09*	363.92*
	(216.67)	(215.97)
Inter-capital distance	−0.00007	−0.00008
	(0.00005)	(0.00005)
State Capacity		
Transnational minority	−0.13**	−0.10*
	(0.06)	(0.06)
Mean per capita GDP	−0.00002	−0.00002
	(0.00003)	(0.00003)
Security Pressures		
Major-minor dyads	−0.19*	−0.23**
	(0.11)	(0.11)
Peace years	−0.004***	−0.004***
	(0.001)	(0.001)
Low polity	−0.0008	
	(0.0060)	
Military alliance		0.10*
		(0.06)
Mountainous terrain	−0.02***	−0.02***
	(0.002)	(0.002)
Constant	2.97***	2.96***
	(0.09)	(0.08)
Observations	218	204
R-squared	0.48	.49

Standard errors in parentheses; *$p < .1$; **$p < .05$; ***$p < .01$.

border aligned with various topographical formations, such as mountains and rivers.[7] Both performed similarly and consistently with Fearon and Laitin's measure (see the appendix).

Robustness Checks

The results of our analyses suggest that trade incentives and security dangers lead to increases in the road and railroad networks that connect neighboring states, while state capacity has much less impact that might be initially expected. The presence of transnational minority groups is mildly associated

[7]We defined mountainous borders as those having mountainous terrain within 50 miles of the boundary (source: National Geographic's 1999 *Atlas of the World*). We also identified the tallest mountain within 50 miles of the border (in meters). The correlation between our dummy variable and Fearon and Laitin's mountainous terrain measure is .22. Our *tallest mountain* variable is correlated with Fearon and Laitin's measure at .69 and our dummy variable at .45; Anderson's measure of the consistency of borders with topographical features correlates with Fearon and Laitin's terrain variable at .14, our mountainous border dummy variable at .12, and our tallest mountain variable at .15.

with diminished transportation infrastructure, but the resources available to dyads have little impact on interaction opportunities. In this section, we report the results of additional tests we ran to examine the sensitivity of our analyses to different case selection strategies. Our findings suggest that some of the results change in response to the cases we examine. Even so, the main findings remain the same: threat and trade are consistently associated with more extensive cross-border interaction opportunities, but dyadic resource levels are not; transnational minority groups make a difference in some dyads, but do not exert a general influence on transportation infrastructure. The results of these robustness checks are reported on Table 4.

First, we reexamined our decision to use a 21-year time lag in our analyses. Isard's (1942) work on the transport-building cycle guided our thought process, but improvements in the technology used in infrastructure projects since that research was published might render his estimates obsolete. We addressed this by reexamining our models using lags of 11 and

TABLE 4 Robustness Tests for OLS Regression of Interaction Opportunities

	Model 12 Time Lag 1981	Model 13 Time Lag 1986	Model 14 "Time Lag" 1996	Model 15 Including new dyads	Model 16 Cook's d analysis
Trade Incentives					
Dyadic GDP	0.0002**	.0001	−0.0006**	0.0002	0.0008***
	(0.00008)	(0.00006)	(0.0003)	(0.0001)	(0.0003)
Mean trade openness	159.03	410.52	−51.33	333.39*	308.20*
	(101.54)	(270.85)	(102.41)	(180.16)	(185.87)
Distance	−0.0001**	−0.00006	−.00002	−0.00004	−0.00005
	(0.00004)	(0.00004)	(0.00005)	(0.00004)	(0.00005)
State Capacity					
Transnational minority	−0.09*	−0.10*	−0.07	−0.08	−.08
	(0.05)	(0.05)	(0.05)	(0.05)	(.05)
Mean per capita GDP	−.00000002	.000001	.000003	0.00003	.000007
	(.00001)	(.00002)	(.000006)	(0.00002)	(.00003)
Security Pressures					
Major-minor dyads	−0.28**	−0.28**	−0.001	−0.18*	−0.33***
	(.11)	(.11)	(0.098)	(0.10)	(.11)
Peace years	−0.002*	−.003**	−.002	−0.003***	−.003*
	(.001)	(.001)	(.001)	(0.001)	(.001)
Mean polity score	−0.008*	−0.009*	−0.003	−0.01*	−.008
	(0.005)	(0.006)	(0.005)	(0.005)	(.005)
Mountainous terrain	−0.02***	−.02***	−0.02***	−0.02***	−0.02***
	(0.00)	(.00)	(0.00)	(0.00)	(0.00)
New dyads				−0.08	
				(0.08)	
Constant	2.95***	2.91***	3.10***	2.88***	2.90***
	(0.07)	(0.08)	(0.08)	(0.08)	(0.08)
Observations	218	215	252	245	184
R-squared	.49	.48	.47	.50	.57

Standard errors in parentheses; *$p < .1$; **$p < .05$; ***$p < .01$.

6-years (see Model 12 and 13). The results are largely consistent with our initial findings, although *mean GDP/cap* and *average polity score* are no longer significant when shorter lags are introduced. Nevertheless, *terrain roughness*, *transnational separatist groups*, *peace years*, and *major-minor dyads* perform in a manner consistent with the baseline analysis. The effects of the variables tend to diminish as our lags get smaller, but this is to be expected. The further the data in our models get from the conditions that gave rise to the infrastructure investments, the weaker the predictions from the models should be.

Even though we employed relatively long time lags, we wanted to ensure that the causal direction of the relationships we uncover ran in the direction we are theorizing. With this in mind we attempted to predict interaction opportunity in 1992 using 1996 measures for our independent variables. As expected, this check failed (see Model 14). For most independent variables in our models, introducing time lags are necessary to demonstrate statistically significant relationships with interaction opportunity. Only the *terrain* (a constant in our models) and *dyadic GDP* show a relationship to the density of cross-border road and railroad networks. This result bolsters the notion that it is anticipated effects that drive the development of interaction opportunity structures.

Next, we reestimated the models with cases that included dyads that emerged after 1971 (as determined by the COW coding rules). New dyads behave differently than old ones (Maoz, 1996), a result that may extend to the development of cross-border transportation links. Nearly all the new dyads in our sample emerged either from the process of decolonization or the breakup of the Soviet empire. This legacy of domination might account for the road and railroad networks within dyads. In some cases, colonial powers invested in road and railroad infrastructure in their colonies to consolidate their control over those territories. Former Soviet states, like Tajikistan, were internal territories of a large multinational empire and may have more extensive transportation networks as a result.

None of the models we examined, however, suggest that *new dyads* (see Model 15, b $= -.08$, $p > .1$) are distinct from the larger pool of dyads in our sample. The *post-Soviet states*, a subset of all the new dyads, are also indistinguishable from the other cases in our models (see appendix). The additional cases, however, do influence the results in other ways. D*yadic GDP* (b $= .0002$, $p > .1$) and *distance* (b $= .00004$, $p > .1$) are no longer significant predictors of interaction opportunities when these dyads are included.

Finally, we reestimated Model 4 (see Model 16) after eliminating the most influential observations (using the Cook's D statistic). Once again, the results support our initial analyses, but the weakest predictors, such as dyadic regime type and transnational separatist groups (b $= -.08$, $p > .1$), fail to achieve standard levels of statistical significance in this more demanding test.

CONCLUSIONS

Our results demonstrate that road and railroad networks across borders are influenced primarily by the external concerns neighbors have about trade and security. Internal capabilities of governments appear less important.The prospect of lucrative trade opportunities tends to promote investments in road and railroad networks along international borders. We find that the general openness of dyads to trade also seems to encourage investment in transportation infrastructure while distance reduces the appeal of road and railroad projects.

With regard to security, the development of transportation networks appears to be positively related to threat levels. A history of prior conflict and more balanced power configurations, which tend to make conflict more likely, are clearly associated with more extensive interaction opportunities. Taken together, these results suggest that the advantages of mobility are generally believed to outweigh the defensive benefits of difficult-to-traverse terrain. Dyadic regime type, which plays a large role in cooperative and conflictual dynamics more generally, has less impact on the development of interaction opportunities, but it too behaves in a manner consistent with the *mobility thesis*: lower levels of democracy are associated with more developed transportation networks in border areas.

While our analysis points to the importance of trade and security in the development of transportation networks, state capacity seems to have little influence on road and railroad construction. Some evidence points to the ability of transnational minority groups to restrict the development of roads and railroads along the border. Yet, we find this effect to be both modest and dependent upon a few influential observations. The relationship between economic development and border permeability is even weaker. Only one of the models we examined produced a statistically significant relationship between dyadic resource levels and interaction opportunities. If available resources influence the development of cross-border transportation networks, they must not do so in a straightforward fashion. Dyads comprised of more highly developed countries do not have greater interaction opportunity levels than those comprised of less developed countries. Since our dependent variable measures roads and railroads only within a limited zone around the border, our findings should not be taken to imply that road and rail building is generally unrelated to state capacity. These results do indicate, however, that transportation networks *within border areas* appear more responsive to external pressures than internal ones.

The strategic nature of border permeability revealed by this study has several implications for thinking about interstate relations. Our results suggest that interaction opportunities are importantly influenced by the choices of states acting in anticipation of future conflict and cooperation. Yet, opportunity levels are often treated as exogenous to the cooperative/conflictual dynamics within dyads, rather than as endogenous to the process of strategic interaction.

Given that trade incentives and security pressures both influence interaction opportunities, this endogeneity is potentially relevant across a wide range of research questions. For instance the notion that trade and security influence interaction opportunities may complicate the theoretical story about the relationship between conflict and cooperation. Cooperative and conflictual dyadic relations are often portrayed as opposing processes that are produced by separate virtuous and vicious circles. Our results, however, suggest that these vicious and virtuous processes may not be distinct at all. By contributing to the development of interaction opportunities, the processes of trade and conflict set the stage for their opposites to emerge in the future. Roads and railroads, after all, are dual use technologies and interaction opportunities are just that: chances for neighboring states to influence the course their relations take.

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APPENDIX

TABLE A1 Summary Statistics of Selected Variables

			Quartiles				
Variable	Mean	S.D.	Minimum	.25	Median	.75	Maximum
Opportunity level	2.61	0.50	1.20	2.29	2.81	3.00	3.30
Transnational minority	0.31	0.46	0.00	0.00	0.00	1.00	1.00
Mountainous terrain	18.26	16.56	0.00	4.00	14.20	29.20	73.95
Dyadic GDP	96.7	168.12	1.50	6.30	24.84	119.12	1210.74
Mean per capita GDP	1444.53	209.91	421.36	909.08	1637.28	1628.96	13649.50
Peace years	15.08	19.53	0.00	4.50	11.00	17.00	155.00
Mean polity score	−3.75	5.52	−10.00	−8.00	−7.00	−0.25	10.00
Major-minor dyads	0.13	0.34	0.00	0.00	0.00	0.00	1.00
Distance	708.09	625.10	5.00	292.00	497.00	916.50	3990.00
Avg. trade openness	0.0002	0.0001	0.00002	0.0001	0.0002	0.0002	0.0008

TABLE A2 OLS Regressions of Interaction Opportunities Using Alternative Specifications for International Cooperation

	Model A1	Model A2	Model A3
Trade Incentives			
Dyadic GDP	0.0002	0.0005*	0.0005*
	(0.0004)	(0.0003)	(0.0003)
Mean trade openness	416.14	361.45	385.02*
	(309.95)	(222.01)	(215.57)
Distance	−0.0002*	−0.0001**	−0.00008
	(0.00009)	(0.00005)	(0.00005)
State Capacity			
Transnational minority	−0.15*	−0.16**	−0.14**
	(0.08)	(0.06)	(0.06)
Mean per capita GDP	−0.00002	−0.00003	−0.00001
	(0.00004)	(0.00003)	(0.00003)
Security Pressures			
Major-minor dyads	−0.12	−0.17	−0.23**
	(0.19)	(.12)	(0.11)
Peace years	−0.00008	−0.003*	−0.004**
	(0.003)	(0.0015)	(0.001)
Mean polity score			−0.01*
			(0.006)
Common IGOs	0.004		
	(0.004)		
Political affinity		0.09	
		(0.18)	
European dyad			0.08
			(0.08)
Mountainous terrain	−0.02***	−0.02***	−0.02***
	(0.002)	(0.001)	(0.002)
Constant	2.97***	2.93	2.91***
	(0.09)	(0.15)	(0.08)
Observations	103	181	200
R-squared	.54	.47	.49

Standard errors in parentheses; *$p < .1$; **$p < .05$; ***$p < .01$.

TABLE A3 OLS Regressions of Interaction Opportunities Using Alternative Specifications for Terrain

	Model A4	Model A5
Trade Incentives		
Dyadic GDP	0.0004*	0.0006*
	(0.0003)	(0.0003)
Mean trade openness	825.88***	692.05***
	(230.88)	(261.51)
Inter-capital distance	−0.00014**	−0.00012*
	(0.00006)	(0.00006)
State Capacity		
Transnational minority	−0.17**	−0.19***
	(0.07)	(0.07)
Mean per capita GDP	−0.000002	−0.00002
	(0.000022)	(0.00003)
Security Pressures		
Major-minor dyads	−0.24*	−0.35**
	(0.13)	(0.15)
Peace years	−0.005***	−0.004***
	(0.002)	(0.002)
Mean polity score	−0.02***	−0.01
	(0.01)	(0.01)
Mountainous border	−0.30***	
	(0.08)	
Percent topographical		−0.003**
		(0.001)
Constant	2.85***	2.79***
	(0.11)	(0.12)
Observations	204	182
R-squared	.30	.26

Standard errors in parentheses; * $p < .1$; ** $p < .05$; *** $p < .01$.

TABLE A4 New Dyad Checks

	Model A6	Model A7
Dyadic GDP	0.0002	0.0002
	(0.0001)	(0.0002)
Distance	−0.00004	−0.00005
	(0.00004)	(0.00004)
Mean trade openness	332.58*	292.76
	(180.63)	(186.83)
Transnational minorities	−0.08	−0.09*
	(0.05)	(0.05)
Mean GDP/cap	0.00003	0.00004*
	(0.00002)	(0.00002)
Major-minor dyads	−0.18*	−0.19*
	(0.10)	(0.10)
Peace years	−0.003***	−0.003***
	(0.001)	(0.001)
Average polity score	−0.01*	−0.01**
	(0.01)	(0.01)
Mountainous terrain	−0.02***	−0.02***
	(0.00)	(0.00)
New dyads	−0.08	
	(0.08)	
Violent terr. change	−0.05	
	(0.36)	
Post-Soviet states		−0.14
		(0.12)
Constant	2.88***	2.87***
	(0.08)	(0.08)
Observations	245	245
R-squared	0.50	0.50

Standard errors in parentheses; *$p < .1$; **$p < .05$; ***$p < .01$